SELECTED WATER RESOURCES ABSTRACTS

VOLUME 8, NUMBER 9
MAY 1, 1975

W75-04351 -- W75-04850

SELECTED WATER RESOURCES ABSTRACTS is published semimonthly for the Water Resources Scientific Information Center (WRSIC) by the National Technical Information Service (NTIS), U.S. Department of Commerce. NTIS was established September 2, 1970, as a new primary operating unit under the Assistant Secretary of Commerce for Science and Technology to improve public access to the many products and services of the Department. Information services for Federal scientific and technical report literature previously provided by the Clearinghouse for Federal Scientific and Technical Information are now provided by NTIS.

SELECTED WATER RESOURCES ABSTRACTS is available to Federal agencies, contractors, or grantees in water resources upon request to: Manager, Water Resources Scientific Information Center, Office of Water Research and Technology, U.S. Department of the Interior, Washington, D. C. 20240.

SELECTED WATER RESOURCES ABSTRACTS is also available on subscription from the National Technical Information Service. Annual subscription rates are: To the SWRA Journal, $75 ($95 foreign); to the Journal & Annual Index, $100 ($125 foreign); to the Annual Index only, $50 ($65 foreign). Certain documents abstracted in this journal can be purchased from the NTIS at prices indicated in the entry. Prepayment is required.

SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Research and Technology, U.S. Department of the Interior

VOLUME 8, NUMBER 9
MAY 1, 1975

W75-04351 -- W75-04850

The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, D. C. 20240

CONTENTS

FOREWORD----------iii

SUBJECT FIELDS AND GROUPS

(Use Edge Index on back cover to Locate Subject Fields and Indexes in the journal.)

01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Non-Water Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION
Includes the following Groups: Identification of Pollutants; Sources of Pollution; Effects of Pollution; Waste Treatment Processes; Ultimate Disposal of Wastes; Water Treatment and Quality Alteration; Water Quality Control.

06 WATER RESOURCES PLANNING
Includes the following Groups: Techniques of Planning; Evaluation Process; Cost Allocation, Cost Sharing, Pricing/Repayment; Water Demand; Water Law and Institutions; Nonstructural Alternatives; Ecologic Impact of Water Development.

07 RESOURCES DATA
Includes the following Groups: Network Design; Data Acquisition; Evaluation, Processing and Publication.

08 ENGINEERING WORKS
Includes the following Groups: Structures; Hydraulics; Hydraulic Machinery; Soil Mechanics; Rock Mechanics and Geology; Concrete; Materials; Rapid Excavation; Fisheries Engineering.

09 MANPOWER, GRANTS, AND FACILITIES
Includes the following Groups: Education—Extramural; Education—In-House; Research Facilities; Grants, Contracts, and Research Act Allotments.

10 SCIENTIFIC AND TECHNICAL INFORMATION
Includes the following Groups: Acquisition and Processing; Reference and Retrieval; Secondary Publication and Distribution; Specialized Information Center Services; Translations; Preparation of Reviews.

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

1. NATURE OF WATER

1A. Properties

THE COALESCENCE OF WATER DROPS,
Tel Aviv Univ. (Israel). Dept. of Environmental Sciences.
Z. Levin.
Available from the National Technicalp 41, Information Service, Springfield, Va. 22161, as AD-784 198, $3.75 in paper copy, $2.25 in microfiche. Report No E1607, p 41, August 1974. 10 fig, 3 tab, 16 ref. DAJA37-73-C-1580.

Descriptors: *Drops(Fluids), *Coalescence, Viscosity, Viscous flow, Theoretical analysis, *Model studies, Electricity, Equations, Physical properties.
Identifiers: *Collision-coalescence process, *Water drops, Equations of motion, Oscillations, Drop deformation.

The first year results of a theoretical study to explain the phenomena of coalescence of drops were presented. Even though the model represents a gross simplification of the real situation, it shows remarkable agreement with some recent experimental results. At this stage the model investigates the effects of the viscous force between the interacting drops, but future work will include both the effects of the electrical double layer and the oscillation of the surfaces of the drops. (Jones-ISWS)
W75-04728

2. WATER CYCLE

RELATION OF OROGRAPHIC WINTER PRECIPITATION PATTERNS TO METEOROLOGICAL PARAMETERS,
National Weather Service, Silver Spring, Md. Office of Hydrology.
E. L. Peck.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 234-242, 1973. 1 fig, 3 tab, 5 ref.

Descriptors: *Precipitation(Atmospheric), *Mountains, Winter, *Orography, Statistical methods, Correlation analysis, Regression analysis, Variability, Radiosondes, *Utah, Temperature, Dew point, Condensation, Advection.
Identifiers: *Wasatch Front range(Utah), Vorticity, Vertical velocity, Wet bulb potential temperature.

Patterns of orographic precipitation in the western United States are subject to considerable variation. Knowledge and predictability of these variations would provide a basis for improved short- and long-term streamflow forecasts and precipitation analyses. Previous studies have demonstrated that observed variations in precipitation distribution are related to types of synoptic situations. Multivariate (canonical) correlation analyses were used to determine whether meteorological parameters may be used to predict the distribution patterns of winter precipitation without the need for storm typing. Twelve-hour precipitation values for stations in the Wasatch Front range of northern Utah having a large range of elevation were correlated with meteorological parameters derived from concurrent radiosonde observations. The meteorological parameters were sufficient to define general precipitation patterns for winter orographic precipitation. (See also W75-01961) (Jones-ISWS)
W75-04670

2A. General

AN ANALYSIS OF FOREST WATER PROBLEMS IN GEORGIA,
Georgia Univ., Athens. School of Forest Resources.
For primary bibliographic entry see Field 4D.
W75-04356

STUDY OF SUBSURFACE FLOW INTO MOUNTAIN STREAMS AS RELATED TO TOPOGRAPHY AND PARTIAL (VARIABLE) SOURCE AREAS,
Georgia Univ., Athens. School of Forest Resources.
For primary bibliographic entry see Field 4D.
W75-04357

THE VARYING SOURCE AREA OF STREAMFLOW FROM UPLAND BASINS,
Georgia Univ., Athens. School of Forest Resources.
For primary bibliographic entry see Field 4D.
W75-04358

CORRELATION OF HYDROLOGIC MODEL PARAMETERS WITH CHANGING LAND USE AS DETERMINED FROM AERIAL PHOTOGRAPHS,
Clemson Univ., S. C. Dept. of AGgricultural Engineering.
For primary bibliographic entry see Field 4C.
W75-04448

A HYBRID COMPUTER SIMULATION MODEL FOR PREDICTING THE EFFECTS OF THE AREAL DISTRIBUTION OF PRECIPITATION ON RUNOFF CHARACTERISTICS,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 2B.
W75-04692

2B. Precipitation

TORNADO OR DUST DEVEL: THE ENIGMA OF DESERT WHIRLWINDS,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
S. B. Idso.
American Scientist, Vol 62, No 5, p 530-541, September-October, 1974. 11 fig, 42 ref.

Descriptors: *Tornadoes, *Dust storms, *Fronts(Atmospheric), *Wind velocity, *Turbulence, Thunderstorms, Cyclones, Meteorology, Mountains, Weather patterns, Model studies, Arizona, Air circulation, Vortices, Air-earth interfaces.

Large dust devils can be more destructive than weak tornadoes, and both have similar morphology and life cycles. Tornadoes usually occur with parent clouds, and dust devils form in clear air, but gradations between them exist. Descriptions and photographs from southern Arizona show the similarity. Worldwide observations and theories are reviewed. Both types are compared to vortices associated with several kinds of density currents, including snow avalanches, volcanic ash flows, cold fronts, and haboobs (arid land dust storms generated by cold air outflow from thunderstorms). New models proposed explain how a haboob-formed vortex can become a tornado, and how a small mountain can induce twin vortex formation. More organized observations are needed. (Duffield-Arizona)
W75-04372

SOME CHARACTERISTICS OF HAWAIIAN HIGH-INTENSITY RAINFALL,
Hawaii Univ., Honolulu. Water Resources Research Center.
C. M. Fullerton, and S. K. Wilson.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 239 398, $4.25 paper copy, $2.25 microfiche. Technical Report No 78, UHMET 74-01, August 1974. 47 p, 29 fig, 4 tab, 33 ref. OWRT B-026-HI (1), 14-31-0001-3872.

Descriptors: *Rainfall intensity, *Rain gages, *Networks, Atmospheric pressure, Wind velocity, Winds, Computer models, Air temperature, *Hawaii, Instrumentation, Clouds.
Identifiers: *Raindrop size, Potential gradient, Microbarograph, *Showers.

A computer monitored network of rapid response Raymond-Wilson rainfall intensity gauges has been established at the Cloud Physics Observatory (CPO), on the windward coast of the island of Hawaii, to record the passage of both warm and cold showers. These showers are characterized by high intensity rainfall (50 to 300 mm/hr) and an associated increase in atmospheric pressure, a change in wind velocity, and a reversal of the electric potential gradient. The showers often occur at night, during the maximum of the diurnal pressure oscillation, and frequently in groups of two to four with an interval of 103 to 104 seconds between separate showers. A relationship between the height of the base of the trade wind inversion and the total amount of rainfall was observed, indicating that almost no rainfall occurs if the inversion base is less than 2 km. A drop-size instrument (DSI) was developed and used to measure the raindrop-size spectrum. From this measurement and the rainfall intensity, an estimation of the liquid water content (LWC) of precipitating clouds was derived. The LWC (2.0 to 8.0 g/m3) was larger than that generally assumed for trade wind showers.
W75-04442

RAINFALL PATTERNS AND GENERAL ATMOSPHERIC CIRCULATION,
D. Winstanley.
Nature, Vol 245, September 28, 1973. p 190-194, 1 tab, 7 fig, 18 ref.

Descriptors: *Rainfall, *Climatic data, *Circulation, Long-term planning, Arid climates, Climatology, Climatic zones, Isohyets, Atmosphere, Drought.
Identifiers: *Sahel zone, Mediterranean, Middle east, India, Sahara Desert.

Rainfall records of the Mediterranean, the Middle East, the Sahel Zone, and north-west India from the beginning of this century were analyzed. Rainfall fluctuations are related to changes in the general circulation of the atmosphere. From the analysis, an idea of long term rainfall prospects and future climatic patterns can be obtained. In these marginal arid areas like the Sahara, human response to low and variable rainfall is nomadism. Climatology will play an important role in long term planning in economic and political problems of the affected countries. (Mastic-Arizona)
W75-04513

IMPROVED INSTRUMENTATION FOR MEASURING MELTED PRECIPITATION ON WIND-SWEPT TOPOGRAPHY,
Forest Service (USDA), Moscow, Idaho. Intermountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 7B.
W75-04655

PRECIPITATION MEASUREMENTS BY MEANS OF STORAGE GAUGES WITH

STEREO AND HORIZONTAL ORIFICES IN THE BAYE DE MONTREUX WATERSHED,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau, Hydrologie und Glaziologie.
For primary bibliographic entry see Field 7B.
W75-04656

EVAPORATION LOSSES FROM STORAGE GAUGES,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau, Hydrologie und Glaziologie.
For primary bibliographic entry see Field 7B.
W75-04657

ANALYSIS OF SNOW COVER DISTRIBUTION FROM AEROPHOTOGRAPHY DATA OVER EXPERIMENTAL MOUNTAIN BASIN OF VARZOB RIVER,
Hydrometeorological Service of the USSR, Moscow.
For primary bibliographic entry see Field 7B.
W75-04658

SNOW SURVEY AND METHODS FOR SNOW STORAGE ESTIMATION IN MOUNTAIN RIVER BASINS OF THE SOVIET UNION,
Hydrometeorological Service of the USSR, Moscow.
For primary bibliographic entry see Field 2C.
W75-04659

A POSSIBILITY OF AIRFLOW - PRECIPITATION REGIME INVESTIGATIONS,
Hydrometeorological Inst. of Croatia, Zagreb (Yugoslavia).
N. Sinik.
In: Distribution of Precipitation In Mountainous Areas, Vol. II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 128-139, 1973. 6 fig, 2 tab, 6 ref.

Descriptors: *Precipitation(Atmospheric), *Forecasting, *Statistical methods, *Mountains, Isohyets, Hydrology, Correlation analysis, Probability, Orography, Forecasting, Distribution patterns.
Identifiers: *Gradient flow, Rain days, Airflow, *Yugoslavia(Lika-Gorski Kotar).

Daily precipitation patterns for Gorski Kotar and Lika (Yugoslavia) were correlated with the prevailing gradient windflow as determined from the corresponding 1000 and 850 mb pressure patterns. The cases where the wind directions were nearly the same at both pressure levels were determined and the isohyetal pattern for those unique cases drawn. It was found that only rainy days with stationary gradient flows at the 1000 mb surface could be added to the cases with parallel flows at both pressure surfaces. The project was confined to the year 1962 and additional study was recommended to insure that the results are applicable as a forecast device for precipitation expectation with wind direction. (See also W75-01961) (Jones-ISWS)
W75-04660

CHARACTERISTICS OF PRECIPITATION IN THE SCOTTISH HIGHLANDS,
Oxford Univ. (England). Dept. of Agricultural Science.
F. H. W. Green.
In: Distribution of Precipitation In Mountainous Areas, Vol. II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 140-146, 1973. 2 fig, 4 ref.

Descriptors: *Precipitation(Atmospheric), *Topography, Rainfall, Snowfall, Mountains, Rainfall disposition, Distribution patterns, Measurement.
Identifiers: *Scotland(Highlands), Rain days, Hoar frost, Potential evaporation, Potential water deficit.

Precipitation in the Scottish Highlands has highly individual characteristics resulting from the location of Scotland and from its topography. For the same reasons, difficulties in accurate measurement are increased. It was found that the largest annual totals were found on the west coast and this was attributed to the movement of precipitation systems from west to east and most of the precipitation falling on the higher mountains of the west coast. It was also found that precipitation intensity was greater in the highlands than in the lowlands. The potential water deficit was found to be lowest in the highlands of western Scotland, indicating that this area is wetter than any other part of Europe. The occurrence of hoar frost is frequent, but no means have been found to measure its contribution to the total precipitation. Measurements and computation of potential evaporation indicates that precipitation measurements are 5% too low because of the windiness of the highlands. (See also W75-01961) (Jones-ISWS)
W75-04661

RAINFALL AT THE HOHENPEISSENBERG AND THE WEATHER SITUATION,
R. Aniol.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 147-155, 1973. 5 tab, 9 ref.

Descriptors: *Precipitation(Atmospheric), *Mountains, Chinook, Weather patterns, Rain, Advection, Pressure, Distribution, On-site data collections.
Identifiers: *Germany(Hohenpeissenberg Mt), Cold fronts, Warm fronts.

For the summer months during the period 1965-1970, 648 single precipitations at the Hohenpeissenberg were checked for the weather situation. Three main types could be selected. These main weather types show different aerological vertical profiles in the lower part of the troposphere. The total amount, the duration, and the intensity of rain showed significant differences for the main weather types. The main weather types were: advection of cold air, advection of warm air, and weak pressure gradients. It was shown that the presence of the mountain, Hoher Peissenberg, and warm or cold air advection determines the duration and intensity of the precipitation. (See also W75-01961) (Jones-ISWS)
W75-04662

COMPUTATION OF AIR FLOW OVER MOUNTAINS IN STATICALLY STABLE SITUATIONS,
Oslo Univ. (Norway). Inst. of Geophysics.
A. Eliassen.
In: Distribution of Precipitation in Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326, Geneva, Switzerland, 1972. p 156-160, 1 ref.

Descriptors: *Winds, *Mountains, *Mathematical models, *Computer models, Meteorology, Precipitation(Atmospheric), Orography.

Mesoscale features of flow patterns over mountains were determined by numerical integrations, with special emphasis on the distribution of the ascending motions causing orographic clouds and precipitation. (See also W75-01961) (Sims-ISWS)
W75-04663

OROGRAPHIC INFLUENCES ON DISTRIBUTION OF PRECIPITATION,
Oslo Univ. (Norway). Inst. of Geophysics.
K. Pedersen.
In: Distribution of Precipitation In Mountainous Areas, Vol. II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 161-170, 1973. 5 fig, 1 ref.

Descriptors: *Orography, *Precipitation(Atmospheric), *Computer models, Terrain analysis, Winds, Pressure, Radiosondes.
Identifiers: *Geostrophic equations, *Norway, Grid mesh, Smoothing operator, Vertical velocity.

A terrain profile of Norway representative for a grid having a mesh-size of 50 km was estimated as proper for studying the terrain-induced vertical displacements of the air. Using a quasi-geostrophic set of equations, the vertical displacements and the resulting condensation were computed for a given situation, September 4-5, 1968. (See also W75-01961) (Jones-ISWS)
W75-04664

DISTRIBUTION OF PRECIPITATION IN THE SOGNEFJORD REGION,
Bergen Univ. (Norway). Geofisisk Institutt.
E. Skaar.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 171-185, 1973. 6 fig, 4 ref.

Descriptors: *Precipitation(Atmospheric), *Mountains, Wind, Fjords, Valleys, Coasts, *Distribution patterns, Agroclimatology, Weather data, On-site data collections.
Identifiers: *Norway(Sognefjord Region).

During the years 1963-1966 an agroclimatic investigation was carried out in the Sognefjord region, a mountainous area of approximately 11,000 sq km. Daily precipitation amount was measured at 145 stations in the period April to October and at 50 stations in winter. The coast districts are among the most precipitous in Norway. Thus, the average annual precipitation at Brekke is 3354 mm. The valleys at the head of the easternmost parts of the fjord (Laerdal) get only about one-ninth of this amount. The three years concerned, 1964-1966, include one 'wet' year, one 'dry' year, and one year with a near average precipitation amount. The mapping of the distribution of precipitation in this area must to some extent be based on theoretic considerations because most of the stations were sited near the fjord. The distribution pattern is dependent on the general weather type, mainly the wind conditions. This was illustrated by selected short-periods in situations of different weather types. (See also W75-01961) (Jones-ISWS)
W75-04665

MAXIMUM DAILY PRECIPITATION IN GORSKI KOTAR AND LIKA (YUGOSLAVIA) IN RELATION TO THE OVERFLYING AIRSTREAM,
Hydrometeorological Inst. of Croatia, Zagreb (Yugoslavia).
N. Plesko.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 186-197, 1973. 6 fig, 1 tab, 5 ref.

Descriptors: *Precipitation(Atmospheric), *Air circulation, *Excessive precipitation, *Local precipitation, *Probable maximum precipitation, Precipitation intensity, Climatology, Storms, Weather patterns, Winds, Isohyets, Mountains,

Distribution patterns, Climates, Geographical regions, Synoptic analysis.
Identifiers: *Yugoslavia(Gorski Kotar and Lika).

The areal distribution of precipitation daily maximums in Gorski Kotar and Lika (Yugoslavia) was studied in relation to the prevailing airstreams in the atmospheric layer from the earth surface and up to the height of about 1500 m. The isohyetal charts of daily maximums were elaborated for each of eight main wind directions. Based on the theory of Jenkinson the estimates of daily maximums were found for various return periods and for selected stations as well as their maximum expected values. (See also W75-01961) (Huff-ISWS)
W75-04666

STATISTICAL CONSIDERATIONS ABOUT SNOW CONDITIONS IN THE AUSTRIAN ALPS,
Zentralanstalt fuer Meteorologie und Geodynamik, Vienna (Austria).
For primary bibliographic entry see Field 2C.
W75-04667

ABOUT VERTICAL GRADIENTS OF LIQUID PRECIPITATION IN MOUNTAINS,
Hydrometeorological Service of the USSR, Moscow.
A. P. Zhidikov, and A. G. Levin.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 204-211, 1973. 5 fig, 1 ref.

Descriptors: *Precipitation(Atmospheric), *Mountains, *Winds, Rain gages, Isohyets, *Distribution patterns, Wind velocity, Meteorology.
Identifiers: *Liquid precipitation, USSR.

In order to get true vertical representation of precipitation in mountains, vertical profiles of measured precipitation and wind in specified mountainous areas should be taken in combination. Comparisons were made of actual vertical gradients of precipitation with gradients of measured precipitation affected by wind. Suggestions were made for the observational procedures to investigate vertical distribution of liquid precipitation as well as for the procedures to map isohyets of liquid precipitation in mountainous areas. (See also W75-01961) (Jones-ISWS)
W75-04668

METHODS FOR THE STUDY OF LAWS FOR THE DISTRIBUTION OF PRECIPITATION IN MEDIUM-HIGH MOUNTAINS (ILLUSTRATED BY THE VITIM RIVER BASIN),
Gidrometeorologicheskii Institut, Leningrad (USSR).
V. S. Vuglinski.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 212-221, 1973. 6 fig, 3 tab, 5 ref.

Descriptors: *Precipitation(Atmospheric), *Moountains, *Distribution patterns, Water balance, Evaporation, Runoff, Seasonal, Radiation, Orography, Equations.
Identifiers: Radiation balance, Turbulent heat exchange, *USSR(Vitim River Basin).

Methods for the computation of mean annual and monthly precipitation for mountain basins were illustrated by the Vitim River basin in the Trans-Baikal area. On the basis of data from the standard meteorological network with relations between precipitation and the altitude of the region, long-term mean annual and monthly precipitation patterns for individual basins were computed. The areal distribution of precipitation was accounted for by the local orography. Diagrams of the transformation of moisture fluxes over mountainous terrain were presented. A possibility for the determination of mean long-term annual precipitation for mountain basins in the absence of observational data on runoff and radiation balance was considered with the use of the equations of Schreiber, Oldekopp, and Budyko. (See also W75-01961) (Jones-ISWS)
W75-04669

THE DISTRIBUTION OF PRECIPITATION IN SOME MOUNTAINOUS CANADIAN WATERSHEDS,
Atmospheric Environment Service, Calgary (Alberta).
D. Storr, and H. L. Ferguson.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 243-263, 1973. 16 fig, 3 tab, 18 ref.

Descriptors: *Demonstration watersheds, *Watersheds(Basins), *Precipitation(Atmospheric), Rainfall, Rainfall-runoff relationships, *Distribution patterns, *Canada, Slopes, Snowmelt, Snowpacks, Water loss, Water balance, Rain gages, Evapotranspiration, Mountains, Rocky Mountain region, Data collections.
Identifiers: Alberta, British Columbia.

Several research investigations in western Canada include studies of the distribution of precipitation in mountainous regions. Five such projects were described. Three of these are International Hydrologic Decade experimental basin projects located on the eastern slopes of the Rocky Mountains in Alberta. Five to ten years of record were available for these basins and problems of gage exposure, network design, and data collection and analysis were discussed in detail. Two projects in British Columbia, one on Vancouver Island, and another in the Okanagan Basin in the interior, were established more recently and only preliminary results could be provided at this time. (See also W75-01961) (Sims-ISWS)
W75-04671

PHYSIOGRAPHICALLY ADJUSTED PRECIPITATION-FREQUENCY MAPS,
National Weather Service, Silver Spring, Md. Office of Hydrology.
J. F. Miller.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 264-277, 1973. 4 fig, 2 tab, 13 ref.

Descriptors: *Frequency analysis, *Distribution patterns, *Flood recurrence interval, *Orography, *Precipitation(Atmospheric), Rainfall disposition, Precipitation excess, Precipitation intensity, Storms, Snowfall, Weather patterns, Depth-area-duration analysis, Topography, Climatic data, Climatic zones, Moisture, *Maps, Mapping.
Identifiers: Partial duration series, *Index relations.

Recent investigations of the precipitation-frequency regime in the United States have focused on the mountainous western portion of the country. These investigations have attempted to depict the variations of the precipitation-frequency regime with the variations in physiographic factors for return periods between 2 and 100 years and durations of 6 and 24 hours. Relationships between precipitation-frequency data at stations and topographic and climatic parameters, such as elevation, exposure, and normal annual precipitation, were developed to aid in understanding these variations. These relationships were used in the preparation of generalized isopluvial charts. In some portions of the mountainous western United States, snow contributes significantly to the series of extreme precipitation amounts. In these regions, an additional set of maps were prepared to depict the precipitation-frequency regime for the May to October season, when practically all heavy precipitation is in the form of rain. (See also W75-01961) (Huff-ISWS)
W75-04672

THE CHARACTERISTIC CHANGES OF THE AMOUNT OF PRECIPITATION IN CONNECTION WITH ALTITUDE IN THE MOUNTAINOUS AREAS OF YUGOSLAVIA,
Federal Inst. of Hydrometeorology, Belgrade (Yugoslavia).
I. Delijanic.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 278-289, 1973. 5 fig, 1 tab.

Descriptors: *Precipitation(Atmospheric), *Mountains, *Orography, Valleys, Gages, Statistical methods, Regression analysis, Climates, Distribution patterns.
Identifiers: *Yugoslavia, Vertical gradients, Precipitation regions. Atmospheric circulations.

During the preparation of a climatic atlas of Yugoslavia, a series of charts of mean precipitation were prepared. The scarcity of gages in certain districts, particularly in the mountains, required that a means of estimating the precipitation be found. The estimation is complicated in that the records were not homogeneous for the entire period from 1931 through 1960 and the different source regions of moisture and wind regimes cause the different mountainous regions to respond differently to the precipitation-bearing air masses. The inhomogeneous records were resolved through the use of very detailed statistical analysis. The altitude-precipitation relationships were solved by partitioning the country into regions, generally along ridge and valley lines, with similar response characteristics and applying correlation techniques. (See also W75-01961) (Jones-ISWS)
W75-04673

DISTRIBUTION OF PRECIPITATION IN MOUNTAINOUS AREAS OF WEST PAKISTAN,
Pakistan Meteorological Dept., Karachi.
F. C. K. Alam.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switerland, p 290-306, 1973. 6 fig, 2 tab, 10 ref.

Descriptors: *Mountains, *Precipitation(Atmospheric), Isohyets, Rain gages, Topography, Snow, Probable maximum precipitation, Mass curves, Basic data collections, *Distribution patterns.
Identifiers: *Pakistan, Double mass curve technique.

With the inception of the Indian Meteorological Department in 1875, systematic recording of daily rainfall was initiated in the Indo-Pak sub-continent. Prior to 1961, the normal and other isohyetal maps drawn on the basis of available data were found unsatisfactory for the hilly areas. Following the signing of the Indus Basin Treaty 1960, special hydrometeorological studies were taken up in the Pakistan Meteorological Department for the implementation of the Water Resources Projects connected with the Indus Basin Development Plan. By 1961, though the network of raingages had fairly improved, the undeveloped and inaccessible areas, particularly the

mountainous areas of the Northern region were still inadequately or completely ungaged. Consequently, in the studies conducted since 1961, the technique of analysis ensuring homogeneity and accuracy of data were employed. However, the primary draw-back of lack of basic data was considerably eliminated by developing the elevation-barrier-precipitation relationship, depicting the effect of topography of the area on the resultant precipitation. These relationships varied with the season as well as with different project areas. The topographically adjusted normal isohyetal maps thus developed were found to provide reliable results in the computation of the probable maximum precipitation studies. These studies also provided an objective basis for improving the precipitation network in the mountainous areas. (See also W75-01961) (Jones-ISWS)
W75-04674

PRECIPITATION IN TAIWAN MOUNTAINOUS AREAS,
P. S. Pan.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 307-321, 1973. 14 fig, 2 tab, 10 ref.

Descriptors: *Precipitation(Atmospheric), *Mountains, Monsoons, Raingages, Rainfall, Snow, *Orography, Islands, Air circulation, Winds, Runoff, Infiltration, Convection, Cyclones, Isohyets, Elevation, Networks, Typhoons, *Weather.
Identifiers: *Taiwan.

Located astride the Tropic of Cancer, Taiwan has a subtropical climate. Meteorologically, the island is amidst the East Asian Monsoon system, beside being a favorite target of typhoons. Because of its distance from the southern hemisphere source regions, the summer southwest winds approaching Taiwan are weaker and less regular than their winter northeast counterparts. The island receives very little snowfall, even in mountain peaks, exceeding 3000 meters in height; the annual island precipitation attributable mainly to monsoons and typhoons averaged to 2340 milimeters (92 inches). Due to rugged topography and the Central Mountain Range oriented 25 degrees to the northeast, the orographic effect has a great influence on the distribution of precipitation in mountain areas caused by monsoons, and additional precipitation results on the mountain areas caused by tertiary circulations. Analyses of the weather elements were described, while problems both in measurement and calculation of mountain precipitation in Taiwan by orographic effects were discussed. (See also W75-01961) (Jones-ISWS)
W75-04675

OROGRAPHIC INFLUENCES ON THE DISTRIBUTION OF PRECIPITATION,
British Meteorological Office, Bracknell (England).
A. Bleasdale, and Y. K. Chan.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 322-333, 1973. 6 fig, 1 tab, 13 ref.

Descriptors: *Mountains, *Precipitation(Atmospheric), Rainfall, Statistical methods, Computers, Data collections, *Distribution patterns, *Orography.
Identifiers: *United Kingdom, Rainfall-height relationships, Five-km rainfall grid.

The predominant influence of orography on the spatial distribution of average annual rainfall over the United Kingdom has been well known for a long time. Apart from a rather small number of studies for separate districts, knowledge of this influence has been largely based on subjective qualitative appreciation. By using a computer and data for several thousand stations, an attempt was made to investigate the influence in a more precise quantitative sense for the whole country and thereby obtain guidance on the nature of the secondary influences. (See also W75-01961) (Jones-ISWS)
W75-04676

EXTREME THUNDERSTORM RAINFALL IN THE INTERMOUNTAIN WESTERN UNITED STATES,
National Weather Service, Silver Spring, Md. Office of Hydrology.
J. T. Riedel, and E. M. Hansen.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 334-345, 1973. 8 fig, 1 tab, 6 ref.

Descriptors: *Probable maximum precipitation, *Rainfall, *Thunderstorms, *Precipitation(Atmospheric), Mountains, Excessive precipitation, Pacific Northwest U.S., Southwest U.S., *Rocky Mountain region, Depth-area curves, Climatology, Orography, Elevation.

Studies show the intense local thunderstorm is the most critical rain producer for small drainages in the large intermountain region, bordered by the Continental Divide on the east and the Sierra Nevada with their extension, the Cascades, into Canada on the west. Data from such storms, producing rainfalls of 100 to 290 mm in about one hour, were analyzed. Inspection of weather maps generally does not show well-organized systems that account for these occurrences. The seeming lack of simultaneous rains at the nearest surrounding stations, or on adjoining days, points to the local nature of the storms. The development of a generalized chart of probable maximum thunderstorm rainfall was described. Estimates for 1 hour over 2 sq km ranged from 170 to 300 mm within the region. The derived 1-hour rainfall depth-area relation, based on limited data, gave 20% of the 2 sq km value for a 1000 sq km area. Studies to find preferred localities (with respect to terrain features) for most extreme occurrences were described. Some data suggest a decrease in short-duration rains for elevations above 1500 m. Ultimately, for higher elevations, distant from lower valleys, thunderstorm rainfall must begin to decrease. A decrease of 5% per 300 m for elevations above 1500 m was adopted for probable maximum thunderstorm rainfall. (See also W75-01961) (Sims-ISWS)
W75-04677

WATER YIELD AS AN INDEX OF LEE AND WINDWARD TOPOGRAPHIC EFFECTS ON PRECIPITATION,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
H. W. Anderson.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 346-358, 1973. 1 fig, 3 tab, 40 ref.

Descriptors: *Streamflow, *Precipitation(Atmospheric), *Evapotranspiration, *Orography, *Water yield, Watersheds(Basins), Snowmelt, Topography, Elevation, Slopes, Regression analysis, Snow model studies, California.
Identifiers: *Principal component analysis, Barrier height, Sierra Nevada Barrier.

In mountainous areas, the best precipitation maps are derived by distributing streamflow back on the watershed and correcting for evapotranspiration. Special problems arise in the lee of major mountain barriers, such as the Sierra Nevada of California. There, the relation of mean annual streamflow to topography was determined from data for 14 watersheds. Variables indexing effects of rise, air flow separation, spillover, and barrier height explained 99% of the variance; standard error was 11%. Rise and flow separation were important. Streamflow increased for the area 8 km to the lee of the Sierra Nevada ridge, and decreased progressively with elevation above and below about 2700 m. Evapotranspiration estimates were obtained from snow course accumulations during periods with snow only and from the streamflow relations to topography. (See also W75-01961) (Huff-ISWS)
W75-04678

INFLUENCE OF OROGRAPHY ON THE SHARE OF PRECIPITATION IN THE EAST ALPINE HIGH MOUNTAINS,
H. Tollner.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 359-361, 1973.

Descriptors: *Precipitation(Atmospheric), *Mountains, *Orography, Convection, Rainfall disposition, Distribution patterns.
Identifiers: *Eastern Alps, Rain shadows, Totalizers.

During an observational period from 1932 through 1938, it was found by using totalizers that the maximum precipitation occurrence was not realized at higher elevations at the same time that it occurred in the valleys. Similar patterns were revealed in the records from ombroscopes over a longer period of time. The temporal variation of the precipitation maxima were found to be related to: (1) intensification of instability by high-level heat sources with particular solar aspect, (2) rain shadowing of certain areas by mountains upwind during the normal summertime westerly and northwesterly flow, and (3) an unequal increase in springtime of the upslope precipitation. (See also W75-01961) (Jones-ISWS)
W75-04679

ON THE PROBLEM OF VERTICAL DISTRIBUTION OF PRECIPITATION, ESPECIALLY IN AREAS WITH GREAT HEIGHT DIFFERENCES,
Uppsala University, Uppsala (Sweden), Dept. of Physical Geography.
B. E. Ryden.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 362-372, 1973. 3 fig, 2 tab, 9 ref.

Descriptors: *Precipitation(Atmospheric), *Elevation, Mountains, Rainfall, Variability, Regression analysis, Rain gages, Instrumentation, Climates, On-site data collections, Measurement.
Identifiers: *Sweden.

Precipitation was measured by totalizers during the summers of 1967 to 1971 in the high mountains of northern Sweden. The totalizers were of a simple and robust construction, fitting the hard weather conditions at high levels above the tree line. The sites of the instruments covered a vertical distribution of more than 1500 meters in the drainage basin. Results showed a near linear increase of precipitation with altitude. During the season with the higher amount of precipitation, the increase with altitude was greater. (See also W75-01961) (Sims-ISWS)
W75-04680

STUDY OF OROGRAPHIC EFFECT ON OPTIMUM NUMBER OF RAINGAUGES,
Central Water and Power Research Station, Poona (India).
For primary bibliographic entry see Field 7A.
W75-04681

SPECTRA OF PRECIPITATION SERIES IN MOUNTAINOUS REGIONS,
Agricultural Research Service, Beltsville, Md. Hydrograph Lab.
For primary bibliographic entry see Field 7A.
W75-04682

THE USE OF THE MODIFIED TIME SERIES ANALYSIS TECHNIQUE FOR THE DETERMINATION OF AREAL PRECIPITATION ACCURACIES,
Aston Univ., Birmingham (England).
P. Hutchinson.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 448-465, 1973. 6 fig, 3 tab, 8 ref.

Descriptors: *Network design, *Time series analysis, *Precipitation(Atmospheric), Rainfall, Elevation, Rain gages, Mathematical studies, Areal.
Identifiers: *New Zealand.

Further work on the development and use of a modified time series analysis technique for determining areal precipitation accuracies, with daily rainfall data from an area of accentuated relief was reported. The effect of changes in the lag intervals was in the determination of the 'standard error' of the areal precipitation was studied and simple rules for the selection of the optimum lag interval were presented. For the given areas, the raingage network density was varied, and the effect of this variation on the calculated accuracy of the areal precipitation was shown. Daily precipitations were grouped according to six prevailing synoptic situations, and it was shown that different accuracies of areal precipitation determinations can be expected, depending upon the synoptic situation. The implications of this work for the design of precipitation gage networks were discussed. It was shown that an increase in the number of gages increases the accuracy of the estimate of areal precipitation, but that this increase is much less than may be expected from considerations of random data. It seems likely that the type of synoptic situation has relatively little effect on the standard error. (See also W75-01961) (Sims-ISWS)
W75-04683

DEFICIENCIES IN MEASURED SNOW PRECIPITATION IN A MOUNTAINOUS AREA IN NORWAY,
Norwegian Water Resources and Electricity Board, Oslo (Norway).
For primary bibliographic entry see Field 2C.
W75-04684

PRECIPITATION ESTIMATES FROM METEOROLOGICAL SATELLITE DATA,
Stanford Research Inst., Menlo Park, Calif.
P. A. Davis, and S. M. Serebreny.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 474-483, 1973. 3 fig, 2 tab.

Descriptors: *Satellites(Artificial), *Precipitation(Atmospheric), Hydrology, Meteorological data, *Remote sensing, Climatic data, Data collections, Watersheds(Basins), *Mountains, Montana, Clouds.

Existing series of cloud photographs from polar-orbiting satellites were utilized in a technique designed to estimate total precipitation (rain and snow) over a mountainous drainage basin in northwestern Montana. Daily precipitation for the entire basin was defined from analyses of surface observations and climatological data within the basin. Satellite-viewed cloud cover was distinguished in terms of eight exclusive categories representative of differing probable contributions to basin precipitation. After a dominant categorization was assigned to each successive 12-hour period, estimates of the cumulative basin precipitation were obtained by summation of probable amounts assigned to each cloud category. Initial applications of the technique with dependent data indicated that good estimates of the cumulative precipitation could be obtained from satellite data over summation periods of about two weeks during the early winter and about five days during the early summer. Subsequently, the technique was tested with independent data; estimates and observations also were compared with independent estimates of precipitation based on radar data analysis. The feasibility and importance of recognizing visible cloud organization and movements was apparent, but the desirability of including satellite infrared data was suggested. (See also W75-01961) (Sims-ISWS)
W75-04685

FACTORS AFFECTING THE ESTIMATE OF AREAL AVERAGE SUMMER AND WINTER PRECIPITATION IN A SMALL CATCHMENT OF THE SWISS PREALPS,
Swiss Forest Research Inst., Birmensdorf.
H. M. Keller.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 484-496, 1973. 2 fig, 6 tab, 11 ref.

Descriptors: *Precipitation(Atmospheric), *Watersheds(Basins), Water balance, Rainfall, Snow, Topography, Mountains, Distribution patterns, Alpine, On-site investigations, Winds, Precipitation gages, Areal, *Seasonal.
Identifiers: *Swiss Prealps.

Four years of record from 12 storage and 4 recording precipitation gages as well as from 17 snow courses in a 300 ha catchment ranging from 1120 to 1640 m ASL were analyzed. The local variation in monthly catch of liquid precipitation is best explained by the topographic position of the gages considering prevailing wind conditions in the catchment. In winter storage gages are of restricted use to estimate the distribution of winter precipitation. Snow course data indicate that snow distribution in winter may be estimated using wind speed and potential radiation as topographic parameters. For the estimate of winter precipitation, however, only data from selected gages can be used. Procedures for data adjustment were given to estimate areal average summer and winter precipitation in the catchment. Annual precipitation becomes about 10% higher when using these procedures. (See also W75-01961) (Sims-ISWS)
W75-04686

AREAL RAINFALL ANALYSIS BY COMPUTER,
British Meteorological Office, Bracknell (England).
For primary bibliographic entry see Field 7C.
W75-04687

COMPUTERIZED CALCULATION OF AREAL PRECIPITATION AND ITS ACCURACY,
Techische Universitaet, Brunswick (West Germany). Leichtweiss Inst. for Water Research.
For primary bibliographic entry see Field 7C.
W75-04688

SOME INTRA-STORM CHARACTERISTICS OF HIGH-INTENSITY RAINFALL BURSTS,
Forest Service (USDA), Utah. Forest Sciences Lab.
E. E. Farmer, and J. E. Fletcher.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 525-531, 1973. 2 fig, 3 tab, 2 ref.

Descriptors: *Cloudbursts, *Rainfall intensity, *Design storm, *Duration curves, *Probable maximum precipitation, Thunderstorms, Precipitation(Atmospheric), Orography, Basic data collections, Convection, Storms, Frequency analysis, Data processing, Networks, Hydrology.

Basic data for analyses of high-intensity rainfall bursts were obtained from two rainfall intensity gage networks located in central and north central Utah. Twenty-five intensity gage stations are located at altitudes between 1325 and 3095 meters, of these, eighteen gages are at altitudes greater than 2440 meters. Analyses included: (1) intra-storm timing and number of bursts, (2) distribution of storm rainfall by 10% of storm duration, and (3) relationship between depth of total storm rainfall and depth of burst rainfall. More than 50% of the total storm rainfall depth occurs in 25% of the storm period; usually more than half of the total depth of rain is delivered as burst rainfall. Rainfall bursts occur most frequently in the first quarter of the storm period. Design data were presented for storms which contain a burst of 10 minutes or longer with return periods of 2 and 10 years. (See also W75-01961) (Sims-ISWS)
W75-04689

A HYDROLOGICAL ASSESSMENT OF PRECIPITATION IN THE WESTERN HIGHLANDS OF NEW GUINEA,
Imperial Coll. of Science and Technology, London (England). Dept. of Civil Engineering.
E. M. Shaw.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 532-543, 1973. 3 fig, 4 tab, 8 ref.

Descriptors: *Rainfall intensity, *Frequency analysis, *Duration curves, Data processing, Rainfall, Areal, Design storm, *Precipitation(Atmospheric), Hydrology, Tropical regions.
Identifiers: *New Guinea.

Estimates of the frequency of high intensity falls and their areal distribution were required during a feasibility study for a land drainage scheme in an intermontane plateau in New Guinea at an altitude of about 1500 m above sea level and with an average annual precipitation of 2600 mm. With the available short-period autographic data and an eighteen-year daily record, depth-duration-frequency curves were established for rainfall at a point. The maximum daily fall recorded in the area is 102 mm, very low in comparison with other regions in the territory. Some tentative explanations were given. The determination of areal rainfall from point measurements was approached in several ways and an average reduction factor of 75% was found for an area of about 420 sq km, assuming a maximum point storm of 102 mm. (See also W75-01961) (Sims-ISWS)
W75-04690

AREA PRECIPITATION MEASUREMENT WITH X-BAND RADAR FROM A MOUNTAIN NORTH OF THE ALPS,
Deutscher Wetterdienst, Hohenpeissenberg (West Germany). Meteorologisches Observatorium.
For primary bibliographic entry see Field 7B.
W75-04691

A HYBRID COMPUTER SIMULATION MODEL FOR PREDICTING THE EFFECTS OF THE AREAL DISTRIBUTION OF PRECIPITATION ON RUNOFF CHARACTERISTICS,
Utah Water Research Lab., Logan.
E. K. Israelsen, and J. P. Riley.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 552-564, 1973. 5 fig, 5 tab, 3 ref.

Descriptors: *Model studies, *Computer models, Rainfall-runoff relationships, *Precipitation(Atmospheric), Watersheds(Basins), Distribution patterns, Mountains, *Utah, Hydrology, *Simulation analysis, *Forecasting.

A distributed parameter hydrologic model based on fundamental relationships, several of which are non-linear, was described. Spatial resolution was achieved by subdividing the modeled area and by applying average values of model parameters within each subzone. Input data for each subzone consisted of precipitation, temperature, and physical characteristics (slope, soil type, rooting depth, and vegetative cover). The snow accumulation and ablation processes were also considered. Presumably, through weather modification procedures it is possible to alter and control the distribution of precipitation on a watershed. To demonstrate its ability to predict the effects of aerial distribution of precipitation on runoff characteristics, the model was applied to a watershed within the Wasatch Mountains of northern Utah. Telemetered precipitation stations are distributed throughout the area. The computer model predicted actual runoff patterns and simulated runoff patterns under assumed patterns of precipitation distribution. (See also W75-01961) (Sims-ISWS)
W75-04692

ESTIMATING AREAL RAINFALL BY FITTING SURFACES TO IRREGULARLY SPACED DATA,
Institute of Hydrology, Wallingford (England).
For primary bibliographic entry see Field 7C.
W75-04693

INADVERTENT RAIN MODIFICATION AS INDICATED BY SURFACE RAINCELLS,
Illinois State Water Survey, Urbana.
P. T. Schickedanz.
Journal of Applied Meteorology, Vol 13, No 8, p 891-900, December 1974. 1 fig, 6 tab, 26 ref.

Descriptors: *Local precipitation, *Weather modification, *Weather patterns, Rainfall disposition, Rainfall intensity, Rain gages, Artificial precipitation, Topography, Statistical methods, Illinois, *Missouri.
Identifiers: *Raincells, *Urban rainfall, *St. Louis(Mo), Wood River(Ill), Urban effects.

Rainfall data from a large dense network are being used to study inadvertent rainfall modification in the St. Louis area. Surface raincells are delineated and then analyzed to determine the character of any urban-induced changes in precipitation. Results for comparisons of 605 potential effect cells and 870 non-effect cells from the summer of 1971-72 provide strong evidence that cell characteristics have been sizeably altered by the local urban-industrial environment. For cells occurring in the urban-industrial zone of St. Louis, the average rainfall volume was 176% greater than for cells in the control sample. For cells occurring in the separate industrial region of Wood River, the average volume was 262% greater than the cells in the control sample. The results show that the primary change in St. Louis cells is total rain area, and this and other results suggest that the change relates to dynamic effects induced by the urban heat island. The primary change in Wood River cells is in rain intensity, and this and other results suggest that this relates to microphysical effects from the industrial aerosols and additions of moisture into the atmosphere, particularly in dry summers. (Huff-ISWS)
W75-04703

FREQUENT OCCURRENCE OF HEAVY RAINFALL ALONG THE NORTH SIDE TO THE LOW-LEVEL JET STREAM IN THE BAIU SEASON,
Meteorological Research Inst., Tokyo (Japan).
T. Akiyama.
Papers in Meteorology and Geophysics, Vol 24, No 4, p 379-388, December 1973. 8 fig, 10 ref.

Descriptors: *Rainfall, *Excessive precipitation, Convection, Winds, Distribution patterns, Jets, Clouds.
Identifiers: *Japan, Baiu front.

The relationship between the heavy rainfall and the low-level jet stream was examined over southwest Japan throughout the Baiu season of 1968. As for the spatial relation, it was concluded that the occurrence of heavy rainfall is mostly confined within the zone about 200 km wide along the north side of the low-level jet axis. The wind speed in the heavy rainfall zone is almost vertically uniform in the thick convective layer while the geostrophic wind speed increases with height. This characteristic wind profile suggests that the intensification of the super geostrophic low-level jet is to be attributed to convective momentum mixing. These observational facts about the relation between the heavy rainfall and the low-level jet were explained by the dynamic model of the low-level jet circulation proposed by Matsumoto and Ninomiya (1971). (Jones-ISWS)
W75-04704

DIURNAL VARIATIONS IN CLOUD CONDENSATION NUCLEI,
State Univ. of New York, Albany. Atmospheric Sciences Research Center.
T-F. D. Lee, and J. E. Jiusto.
Journal of Geophysical Research, Vol 79, No 36, p 5651-5656, December 20, 1974. 4 fig, 1 tab, 11 ref. NSF Grant GA-12735.

Descriptors: *Nucleation, *Condensation, *Cloud physics, Clouds, *Diurnal distribution, Coagulation, *New York, Aerosols, On-site investigations.
Identifiers: *Aitken nuclei, Thermal gradient diffusion chamber.

An increase in the concentration of cloud condensation nuclei at night has been reported frequently in recent years in Australia. An experiment was conducted in New York to determine if and why an evening increase in cloud condensation nuclei might occur. Such a cloud condensation nuclei nocturnal peak was observed over one third of the time and preliminary results suggested that coagulation of smaller Aitken nuclei might be a responsible mechanism. (Jones-ISWS)
W75-04711

RAINDROP CHARACTERISTICS IN SOUTH CENTRAL UNITED STATES,
Agricultural Research Service, Baton Rouge, La.
C. E. Carter, J. D. Greer, H. J. Braud, and J. M. Floyd.
Transaction of the American Society of Agricultural Engineers, Vol 17, No 6, p 1033-1037, November-December 1974. 6 fig, 1 tab, 18 ref.

Descriptors: *Raindrops, *Impact(Rainfall), Erosion, Rates, Rainfall intensity, Energy, Particle size, *Louisiana, *Mississippi, Central U.S., *Gulf Coastal Plain.
Identifiers: *Soil loss, Drop-size distribution, Kinetic energy, Universal soil loss equation, Flour pellet method.

Raindrops were measured by the flour-pellet method to determine why the universal soil loss equation overpredicted erosion along the Gulf Coast. Raindrops measured in Baton Rouge, Louisiana, were not significantly different in size from those measured in Holly Springs, Mississippi. Differences were indicated, however, between raindrop sizes in these two south central states and those measured in Washington, D.C. Median raindrop sizes increased with increasing rainfall intensities up to approximately 2.5 inches per hour then decreased as rainfall intensities increased further. The decrease in median drop sizes at intensities above 2.5 inches per hour was attributed to raindrops breaking into smaller drops as they approached the unstable size of approximately 6.2 mm in diameter. A cyclic relationship between median raindrop size and rainfall intensity was indicated by median drops increasing again in size with increasing rainfall intensities above 8 inches per hour. Such a relationship is reasonable due to : (1) raindrops increasing in size by coalescence, and (2) raindrops decreasing in size by breaking into smaller drops when they reach an unstable size. Kinetic energy values calculated from the south central states data were in close agreement with those presently used in the soil loss equation at low rainfall intensities (3 inches per hour and less). However, for higher intensities (7 to 8 inches per hour), kinetic energies used in the soil loss equation were as much as 50% greater than values obtained for the south central states. (Jones-ISWS)
W75-04713

MICROMETEOROLOGICAL MEASUREMENTS FOR PESTICIDE DRIFT STUDIES,
Missouri Univ., Columbia. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W75-04714

AN ASSESSMENT OF WARM FOG - NUCLEATION, CONTROL, AND RECOMMENDED RESEARCH,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering; and Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
M. L. Corrin, J. R. Connell, and A. J. Gero.
Report No NASA CR-2477, p 143, November 1974. 11 fig, 15 tab, 229 ref, append. NASA NAS8-29583.

Descriptors: *Fog, *Nucleation, Coalescence, Instrumentation, Turbulence, Surface tension, Optical properties, Condensation, Aerosols, Air circulation, Weather modification.
Identifiers: *Fog microphysics, Visibility, Surface films, Drop-size distribution, Liquid water content, Warm fog modification.

A state-of-the-art survey of warm fog research which has been performed up to, and including, 1974 was presented. Topics covered were nucleation, growth, coalescence, fog structure and visibility, effects of surface films, drop size spectrum, optical properties, instrumentation, liquid water content, and condensation nuclei. Included was a summary of all reported fog modification experiments. Additional data were provided on air flow, turbulence, a summary of recommendations on instruments to be developed for determining turbulence, air flow, etc., as well as recommendations of various fog research tasks which should be performed for a better understanding of fog microphysics. (Jones-ISWS)
W75-04717

ATMOSPHERIC WATER RESOURCES MANAGEMENT PROGRAM - BRIDGER RANGE CLOUD SEEDING EXPERIMENT,
Montana State University, Bozeman. Dept. of Earth Sciences.
For primary bibliographic entry see Field 3B.
W75-04721

ATMOSPHERIC MOISTURE PARAMETERIZATION,
Environmental Technical Applications Center, Washington, D.C.
R. D. Smith.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-784 814, $3.75 in paper copy, $2.25 in microfiche. USAFETAC TN 74-1, p 21, January 1974. 15 fig, 6 tab, 25 ref.

Descriptors: *Cloud physics, Weather modification, Thermodynamics, Convection, Condensation, Fog, Clouds, Atmosphere, *Moisture content, Model studies, Temperature, Measurement, Reviews.
Identifiers: *Atmospheric moisture, Liquid state, Solid state, Cloud droplet size distribution, Droplet terminal velocity, Vertical motion, Stratus clouds, Cumulus clouds, Atmospher.

The development of theoretical and empirical means of measuring atmospheric moisture in both the liquid and solid state was reviewed. The relationships developed for moisture parameterization result in the best estimate of liquid and solid water at a point in time and space. These parameterizations are to be used in modeling the distribution of atmospheric moisture by applying nephanalysis and the more conventional parameters from actual and historic three-dimensional data bases. (Jones-ISWS)
W75-04724

AUTOMATION OF THE COLLECTION AND ANALYSIS OF SCIENTIFIC INFORMATION IN THE PROBLEM OF THE INTERACTION OF THE ATMOSPHERE AND OCEAN,
Linguistic Systems, Inc., Cambridge, Mass.
NASA TT F-801, p 185, November 1974, Translated from Avtomatizatsiya sbora i analiz nauchnoy informatsii v probleme vzaimodeystviya atmosfery i okeana, Vol 301, Hydrometeorological Press, Leningrad, 1972, 140 p Borisenkov, Ye P, and Dyubkin, I A, editors.

Descriptors: *Oceanography, *Meteorology, *Model studies, *Data processing, Research equipment, Ships, Instrumentation, Air circulation, Ocean circulation, Theoretical analysis.
Identifiers: Scientific research vessels.

This collection contains material from research into the interaction of the atmosphere and the ocean, including both experimental research conducted aboard scientific research vessels, and work of a theoretical nature. A number of articles are devoted to the principles basic for a ship automated system that collects and analyzes oceanological data. The theoretical articles deal with the basic concepts of hydrodynamic models of atmospheric and oceanic circulation. (See W75-04730 thru W75-04741) (Sims-ISWS)
W75-04729

AUTOMATED SYSTEM FOR MEASUREMENT, COLLECTION AND PROCESSING OF HYDROMETEOROLOGICAL DATA ABOARD SCIENTIFIC RESEARCH VESSELS OF THE GUGMS (SIGMA-S),
For primary bibliographic entry see Field 7C.
W75-04730

SOFTWARE FOR THE SIGMA-S,
For primary bibliographic entry see Field 7C.
W75-04731

SMALL PARAMETRIC MODEL OF THE PRECOMPUTATION OF METEOROLOGICAL FIELDS ON THE BASIS OF COMPLETE EQUATIONS AND ITS ENERGETIC ANALOGS,
For primary bibliographic entry see Field 7C.
W75-04736

ESTIMATE OF HEAT FLUXES ON THE SUBJACENT SURFACE (ACCORDING TO DATA FROM SYNOPTIC ANALYSIS),
For primary bibliographic entry see Field 7C.
W75-04737

THE PROBLEM OF CALCULATING CLOUD COVER IN CALCULATIONS OF LONG WAVE RADIATIONAL CHARACTERISTICS OF THE ATMOSPHERE,
Z. P. Galakhov.
In: NASA TT F-801, p 159-168, November 1974. 3 fig, 11 ref.

Descriptors: *Cloud cover, *Radiation, *Thermal radiation, *Atmosphere, Mathematical models, Model studies, Data processing, Meteorology.

The results of calculating the fluxes of outgoing long wave radiation, taking cloud cover into account, on the basis of mean monthly data were discussed. A three-level and a nine-level model of the atmosphere were used, the nine-level with a one-hundred millibar level as upper limit. Data used in the calculations were collected over many years. (See also W75-04729) (Sims-ISWS)
W75-04740

RECONSTRUCTING THE VERTICAL PROFILE OF HUMIDITY ON THE BASIS OF THE VERTICAL PROFILE OF TEMPERATURE,
T. I. Bazlova.
In: NASA TT F-801, p 169-181, November 1974. 2 fig, 3 tab, 9 ref.

Descriptors: *Humidity, *Temperature, *Model studies, Altitude, Meteorology, Absorption, Radiation, Atmosphere.
Identifiers: *Vertical distribution.

The vertical profile of humidity in the atmosphere was developed on the basis of the vertical profile of temperature by using an empirical formula linking changes in humidity with changes in temperature and altitude. The atmosphere was divided into three layers by altitude because the conditions for the formation of humidity varies with altitude. (See also W75-04729) (Sims-ISWS)
W75-04741

THE OBJECTIVE ANALYSIS OF RELATIVE HUMIDITY,
British Meteorological Office, Bracknell (England).
M. J. Atkins.
Tellus, Vol 26, No 6, p 663-671, 1974. 8 fig, 4 ref.

Descriptors: *Forecasting, *Rainfall, *Humidity, Rainfall intensity, Precipitation(Atmospheric), Meteorology, Model studies, Mixing, Methodology.
Identifiers: Mixing ratio, Primitive equation model, United Kingdom, *Weighting functions(Analysis).

A method of objective analysis of relative humidity was described which makes use of non-isotropic weighting functions. These depend on the gradient of the background field in such a way that observations in a direction along closely packed isopleths have higher weight than those in a direction perpendicular to them. Rainfall predictions with the United Kingdom fine mesh 10-level model were found to be better when based on this humidity analysis than on one using isotropic weighting functions and the results for a particular case were described. The use of surface observations in the lowest layer of the model was discussed and it was shown that it is better to use the surface humidity mixing ratio rather than the surface relative humidity. Resulting forecasts of rainfall are better and do not exhibit the diurnal variations found when using surface relative humidity observations. (Jones-ISWS)
W75-04791

FRONTAL MOTION IN THE ATMOSPHERE,
Tel-Aviv Univ. (Israel), Dept. of Mathematical Sciences.
E. Turkel.
Tellus, Vol 26, No 6, p 630-637, 1974. 8 fig, 14 ref.

Descriptors: *Fronts(Atmospheric), Numerical analysis, Meteorology, Model studies, Equations, Flow, Storms, Boundaries(Surfaces), Air circulation, Equations, *Atmosphere.
Identifiers: *Equations of motion(Atmospheric), Velocity vector.

The motion of frontal disturbances in the atmosphere was studied with a one layer non-linear model proposed by Stoker. The equations of motion were integrated in the interior of the domain by a two step method. Flows resulting from various initial and boundary conditions were considered for considerably longer times than those previously computed. The boundary was followed by a numerical procedure that allows for arbitrary shapes of the front. Hence, flows can be followed until occlusion occurs and the effects of the various initial and boundary conditions on the occlusion process can be accurately compared. In all cases, the cold front propagates faster than the warm front and a relatively strong mass convergence region exists behind the cold front. A cyclonic circulation pattern is clearly visible near the cold front. These facts suggest the occurrence of severe storms associated with cold fronts but not with warm fronts. (Jones-ISWS)
W75-04792

A CRITICAL EXAMINATION OF THE TURBULENCE INSTRUMENT USED IN THE MARSTA MICRO-METEOROLOGICAL FIELD PROJECT,
Uppsala Univ. (Sweden). Dept. of Meteorology.
For primary bibliographic entry see Field 7B.
W75-04795

SENSITIVITY DISTRIBUTION ALONG THE STRIPS OF COMPENSATION PYRHELIOMETERS,
Institute for Atmospheric Physics, Budapest (Hungary).
For primary bibliographic entry see Field 7B.
W75-04796

2C. Snow, Ice, and Frost

TRICKLE IRRIGATION SOIL WATER POTENTIAL AS INFLUENCED BY MANAGEMENT OF HIGHLY SALINE WATER,
Utah State Univ., Logan.
P. Tscheschke, J. F. Alfaro, J. Keller, and R. J. Hanks.
Soil Science, Vol 117, No 4, p 226-231, April, 1974. 1 tab, 5 fig, 5 ref.

Descriptors: *Soil water, *Saline water, *Irrigation, *Irrigation practices, Soil profile, Leaching, Hydraulic gradient, Evapotranspiration, Irrigation water, Salts, Root zone, Irrigation efficiency.
Identifiers: *Trickle irrigation.

Soil water patterns in soil profiles, subjected to four different trickle irrigation management treatments with highly saline water were investigated. The irrigation treatments on cherry tomato plants were (a) daily with a volume of water equal to that used by the plant the previous day, (b) every other day with equal volumes of water (c) below, and (d) above the volume of water evapotranspired. Generally, the soil water potential decreased in the soil profile, as a result of salt accumulation, with increased distance from the trickle source. The highest salt concentration occurred in the profiles irrigated with volumes of water below that evapotranspired by the tomato plants, indicating the importance of avoiding under-irrigation when-

ever highly saline water is used with trickle irrigation. Higher soil water potentials and higher yields resulted from irrigating with volumes above the evapotranspiration rate. (Mastic-Arizona)
W75-04391

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 5: ICE SHEET DISPOSAL,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04405

HAIL AND ITS DISTRIBUTION,
Army Engineer Topographic Labs., Fort Belvoir, Va. Earth Sciences Div.
L. Williams.
Army Engineer Topographic Laboratories, Fort Belvoir, Virginia, Special Report ETL-SR-73-3. 16 p, January, 1973. 4 fig, 1 tab, 26 ref.

Descriptors: *Hail, *Precipitation(Atmospheric), *Ice, *Ice stones, Frequency, Probability, Convection, Distribution patterns, Seasonal.
Identifiers: Hailstorms, Hailstorm distribution.

Hail may occur in regions from the tropics to the polar zones, but the principal world occurrence belt is 30 degrees N to 50 degrees N latitude. The number and severity of hailstorms and their duration can vary widely from year to year. Hailstorms move fairly rapidly; durations average from 3 to 5 minutes. Hail falls in streaks and may combine with several other streaks to cover a continuous and broad swath of ground. Over continental areas, hail activity generally peaks in the late spring and early summer with some areas experiencing a secondary peak in the fall. Being a convective system, hailstorm activity tends to peak in midafternoon to early evening. Probability of occurrence of hailstones ranging from a record 5.6 inches in diameter to 0.25 inches are included for guidance of design engineers. (Mastic-Arizona)
W75-04604

ANALYSIS OF SNOW COVER DISTRIBUTION FROM AEROPHOTOGRAPHY DATA OVER EXPERIMENTAL MOUNTAIN BASIN OF VARZOB RIVER,
Hydrometeorological Service of the USSR, Moscow.
For primary bibliographic entry see Field 7B.
W75-04658

SNOW SURVEY AND METHODS FOR SNOW STORAGE ESTIMATION IN MOUNTAIN RIVER BASINS OF THE SOVIET UNION,
Hydrometeorological Service of the USSR, Moscow.
V. D. Komarov, A. A. Kharshan, and V. M. Muchin.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 111-116, 1973. 1 fig, 3 ref.

Descriptors: *Precipitation(Atmospheric), *Snowfall, *Mountains, Hydrology, Photography, Snowmelt, Snowpacks, Mountain forests, Slopes, Snow cover, Snow surveys, Satellites(Artificial), Water equivalent, Melt water, Water resources, River basins.
Identifiers: *Snow courses, Snow stakes, *USSR.

The procedures for making estimates of the amount of melt water to be expected from mountain watersheds were described. The methods include prescribed snow courses with fixed points of measurement where means of snow depth and density are determined. The average distance between measuring sites varies from 2-10 km with a maximum difference of 15-200 m in height between sites along the same course. The frequency of measurement is on the order of 3-4 times during the winter. Approximately 200 mountain basins are now surveyed in the Soviet Union. Where necessary, helicopters are used to reach inaccessible watersheds. The helicopters are used to read or photograph snow stakes previously set along a snow course. The use of meteorological satellites shows promise for studying the dynamics of snow coverage of the mountains and the snow line altitude. The water equivalent of snow increases with altitude up to the upper boundary of the forest, but decreases above the tree line. The snow pack also decreases with altitude in barren zones. The water equivalent is found by summing the products of the site water equivalent and the areas that they represent. Other formulas are used when snowpack values are unreliable. (See also W75-01961) (Jones-ISWS)
W75-04659

STATISTICAL CONSIDERATIONS ABOUT SNOW CONDITIONS IN THE AUSTRIAN ALPS,
Zentralanstalt fuer Meteorologie und Geodynamik, Vienna (Austria).
K. Cehak.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 198-203, 1973.

Descriptors: *Snow, *Climatology, *Statistical methods, Variability, Precipitation(Atmospheric), Snow cover, Mountains, Distribution patterns.
Identifiers: *Austria(Alps).

Characteristics of the statistical distributions of some precipitation parameters were calculated. The dependency of these characteristics on the place of the observing station with regard to the Alps and to altitude was investigated. The results were represented in a set of composite maps. (See also W75-01961) (Jones-ISWS)
W75-04667

DEFICIENCIES IN MEASURED SNOW PRECIPITATION IN A MOUNTAINOUS AREA IN NORWAY,
Norwegian Water Resources and Electricity Board, Oslo (Norway).
O. G. Gjorsvik.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 466-473, 1973. 3 fig, 2 tab, 1 ref.

Descriptors: *Snow, *Water balance, *Precipitation(Atmospheric), Watersheds(Basins), Mountains, *Measurement, Runoff, Snowpacks, Instrumentation, Melt water, Winter, Winds.
Identifiers: *Norway.

Observations of runoff and precipitation in the Groset area, Norway, showed considerable deficiencies in measured precipitation. The basin has an area of 5.91 sq km and a mean altitude of 990 m ASL. A water balance for the period 1949-1968 was established, based on observations of precipitation (3 stations), runoff, groundwater stage, and snow surveys. A 'true precipitation' was calculated for the winter season from measurements of the snow storage and runoff, and the calculated groundwater runoff. The ratio between this true precipitation and the observed precipitation in Norwegian standard gages was estimated at 1.51. This means that the precipitation gages in the Groset area are able to catch, on the average, 66% of the snow precipitation. (See also W75-01961) (Sims-ISWS)
W75-04684

SIMPLE ALBEDO FEEDBACK MODELS OF THE ICECAPS,
National Oceanic and Atmospheric Administration, Princeton, N.J. Geophysical Fluid Dynamics Lab.
I. M. Held, and M. J. Suarez.
Tellus, Vol 26, No 6, p 613-629, 1974. 10 fig, 21 ref, 3 append. NOAA Grant 04-3-00233 and NSF Grant GA-40341.

Descriptors: *Ice, *Albedo, *Mathematical models, *Glaciology, Model studies, Theoretical analysis, Analytical techniques, Mathematics, Equations, Circulation, Air circulation, Ocean circulation, Solar radiation, Climates, Ice cover, *Variability.
Identifiers: *Diffusive models, Linear diffusive models, Non-linear diffusive models, Global climates, Perturbation theory, Obliquity variations.

A series of simple models of the albedo feedback mechanism and its effect on the global climate were solved analytically. All of the models are similar to one considered by Budyko. The seasonal variation in incident solar radiation was ignored. Emphasis was placed on the parameter dependence of the models' sensitivity to changes in the solar constant. It was found in all cases that increasing the efficiency of the poleward transport of energy increases this sensitivity. It was suggested that knowledge of the partitioning of the transport between the atmosphere and the oceans is of considerable importance for estimating sensitivity. The stability of equilibrium states was determined from the properties of small perturbations away from equilibrium. It was observed that relaxation times of perturbations can be increased considerably by the albedo feedback mechanism. The effect of variations in the obliquity of the planet's orbit on sensitivity and stability was also analyzed. The results indicate that albedo feedback may increase the significance of obliquity variations on Mars, as well as on Earth. (Humphreys-ISWS)
W75-04794

2D. Evaporation and Transpiration

CHANGES IN TRANSPIRATION, NET CARBON DIOXIDE ASSIMILATION AND LEAF WATER POTENTIAL RESULTING FROM APPLICATION OF HYDROSTATIC PRESSURE TO ROOTS OF INTACT PEPPER PLANTS,
Connecticut Univ., Storrs. Dept. of Plant Science.
For primary bibliographic entry see Field 3F.
W75-04399

SILICON CONTENT OF WHEAT HUSKS IN RELATION TO WATER TRANSPIRED,
Commonwealth Scientific and Industrial Research Organization, Glen Osmand (Australia). Div. of Soils.
J. T. Hutton, and K. Norrish.
Aust J Agric Res Vol 25, No 2, p 203-212, 1974. Illus.
Identifiers: Equations, Fertilizers, Growth rates, Nitrogen, Silicon hydroxide, *Wheat, *Transpiration.

Si concentrated in the husks, is about 1/3 of the total Si in the plant, and so the husks were used for transpirational measurements. Samples, from field trials extending over several seasons and from a number of localities, showed that the percent Si in the husks is closely related to water transpired. The equation, water used (cm) = 7.4 + 4.6 (% Si) ($r = 0.99$, $n = 8$), should be applicable to most of the wheat-growing areas of southern Australia, but the addition of fertilizers, particularly N, modifies the equation. The relationship between weight of Si in the tops and water transpired is consistent with the known solubility of $Si(OH)_4$ in soils, but the correlation is poorer than that using percentage Si.--Copyright 1974, Biological Abstracts, Inc.
W75-04484

TRICKLE IRRIGATION SOIL WATER POTENTIAL AS INFLUENCED BY MANAGEMENT OF HIGHLY SALINE WATER,
Utah State Univ., Logan.
For primary bibliographic entry see Field 2G.
W75-04507

EVAPORATION LOSSES FROM STORAGE GAUGES,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau, Hydrologie und Glaziologie.
For primary bibliographic entry see Field 7B.
W75-04657

WATER YIELD AS AN INDEX OF LEE AND WINDWARD TOPOGRAPHIC EFFECTS ON PRECIPITATION,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2B.
W75-04678

A METHOD FOR MEASURING FIRST-STAGE SOIL WATER EVAPORATION IN THE FIELD,
Agricultural Research Service, Temple, Tex. Blackland Conservation Research Center.
G. F. Arkin, J. T. Ritchie, and J. E. Adams.
Soil Science Society of America Proceedings, Vol 38, No 6, p 951-954, November-December, 1974. 5 fig, 8 ref.

Descriptors: *Evaporimeters, *Soil moisture, *Evaporation, Transpiration, Drying, Flow rates, Pressure measuring instruments, Measurement, *Evapotranspiration, *Soil water.
Identifiers: Transducers, Evaporation plate.

An economical, automated method was developed for measuring soil water evaporation during first-stage drying simultaneously at several locations in a field to evaluate the effectiveness of mulches and crop canopies in reducing soil water evaporation. The method also provided a reasonable procedure for separating soil water evaporation during first-stage drying from transpiration, when the total evapotranspiration rate was accurately measured. Water flow through a thin evaporation plate with a known surface area was measured and used as a direct indicator of the evaporation rate. Flow rates could be recorded manually or automatically. Field tests of evaporation indicated that the resolution of the system was equal to that of a precision weighting lysimeter and that the system gave reasonable accuracy on an hourly basis. Mulch rates of 1000, 4000, and 10,000 kg/ha reduced daily soil water evaporation measured with this method by 26, 59, and 78% of the bare soil evaporation. Cumulative daily soil water evaporation was reduced by 57 and 71% under plant canopies with 100- and 50-cm row spacings and similar leaf area indices (3.0 and 2.7, respectively). (Roberts-ISWS)
W75-04698

FEEDLOT WASTE EFFECTS ON SOIL CONDITIONS AND WATER EVAPORATION,
Southwestern Great Plains Research Center, Bushland, Tex.
For primary bibliographic entry see Field 5B.
W75-04699

SYNTHESIS OF HYDROGRAPH RECESSIONS ADJUSTED FOR EVAPOTRANSPIRATION LOSSES,
Howard Univ., Washington, D.C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2E.
W75-04712

LYSIMETER EXPERIMENT DESCRIPTION AND PROGRESS REPORT ON NEUTRON MEASUREMENTS,
Battelle-Pacific Northwest Labs., Richland, Wash.
J. J. C. Hsieh, L. E. Brownell, and A. E. Reisenauer.
Report No BNWL-1711, p 56, 1973. 8 fig, 2 tab, 1 ref, 4 append.

Descriptors: *Lysimeters, *Neutron absorption, Moisture content, *Meteoric water, Soil water, Vadose water, Measurement, *Path of pollutants, Water pollution sources.
Identifiers: Neutron meters, Psychrometers, Thermocouples.

Two large lysimeters were installed in the soil of the Hanford Reservation to gather data on the accumulation and penetration of meteoric water. The construction details of the experiment were described. The soil hydraulic characteristics and data collected for the first 6 months were included. One of the lysimeters was constructed with a closed bottom to prevent interchange of moisture with the vadose zone. If annual precipitation exceeded annual evapotranspiration, the moisture content near the bottom of this lysimeter would have increased. An open bottom lysimeter was constructed to provide data to support the results obtained from the closed lysimeter. Each was 3 meters diameter and 18.3 deep and filled with well-mixed local soil. Each had three tubes to accomodate neutron probes, psychrometers and thermocouples for water potential and soil temperature measurements, and tubes for measuring atmospheric pressure at various depths. (Roberts-ISWS)
W75-04725

2E. Streamflow and Runoff

FLOOD HAZARD REPORTS: TOOLS FOR RESOURCE PLANNING AND MANAGEMENT,
Soil Conservation Service, Grand Rapids, Mich.
For primary bibliographic entry see Field 4A.
W75-04432

RELATIVE RATES OF FLOW OF THE NEGRO AND SOLIMOES RIVERS (DETERMINED) THROUGH O18 CONCENTRATIONS, (IN PORTEGUESE),
Centro de Energia Nuclear na Agricultura, Sao Paulo (Brazil).
E. Matsui, E. Salati, W. L. F. Brinkmann, and I. Friedman.
Acta Amazonica, Vol 2, No 3, p 31-46, 1972, Illus.
Identifiers: *Brazil, *Flow rates, Mixing, Negro River, *Oxygen-18, Rivers, Solimoes River, Isotopic concentration.

Isotopic concentration was measured in different spots of the Rio Negro, Rio Solimoes and Rio Amazonas (Brazil) at regular intervals f 12 consecutive months. Values as found in Rio Negro waters were significantly different from the others. Difference between isotopic concentration found in Rio Negro and Rio Solimoes is useful information for identifying the spot where the Rio Amazonas, formed by the confluence of the Negro and Solimoes, presents a homogenous vertical and horizontal structure after complete mixing of both rivers. A perfect mixture was not found up to 120 km below the confluence. Systematic sampling is a method for the determination of relative outflow of both rivers. The data are close to the results of direct measurements performed by Oltman et al.--Copyright 1974, Biological Abstracts, Inc.
W75-04495

OPTIMAL WEIGHTING FUNCTION IN WATER QUALITY MODELING,
University of Southern California, Los Angeles. Dept. of Electrical Engineering, and Materials Science.
For primary bibliographic entry see Field 5B.
W75-04614

A METHOD FOR DETERMINING PEAK FLOWS AND DETENTION STORAGE REQUIREMENTS IN URBANIZING AREAS.
Soil Conservation Service, Indianapolis, Ind.
For primary bibliographic entry see Field 4A.
W75-04694

RIVER REGIME WITH SPECIAL REFERENCE TO RIVER NILE,
Assiut Univ. (Egypt).
M. B. Khalil.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY1, Proceedings Paper 11072, p 135-153, January 1975. 15 fig, 1 tab, 34 ref, 2 append.

Descriptors: *Regime, *Sedimentation, *Stability, *Channel morphology, *Canals, *River flow, Hydraulic similitude, Dimensional analysis, Hydraulic design, Streams, Particle size.
Identifiers: *Nile River Valley, Silt factor, Laceys regime theory.

A review of canal systems in India and the United States showed that when the variables of flow area, surface slope, and flow velocity are considered proportional to some power of discharge, the value of the exponent of a variable for various canal systems is essentially the same. However, the coefficient of proportionality varies and this variation is attributed to variation in sediment parameters. Natural rivers are irregular and less predictable in their behavior. The exponents of the rate of flow of water for the three variables for natural rivers vary more about the mean value than for the canals. The average slope computed at gaging stations on the Nile and its tributaries varied from 1.53 to 100.0 times 100,000. The relationship between discharge and water depth was analyzed. The water depth was proportional to discharge raised to the 2/5 power. The scatter of observations about the mean line was explained by seasonal filling of the bed with sediments, variation in water slop and sediment concentration, and changes in bed configuration and roughness. For the Nile River, the silt and flow equations seem sufficient to describe the channel geometry. (Singh-ISWS)
W75-04706

EVALUATION PROBLEM OF STORM WATER ROUTING MATHEMATICAL MODELS,
Societe Grenobloise d'Etude et d'Applications Hydrauliques (France).
For primary bibliographic entry see Field 5D.
W75-04708

SYNTHESIS OF HYDROGRAPH RECESSIONS ADJUSTED FOR EVAPOTRANSPIRATION LOSSES,
Howard Univ., Washington, D.C. Dept. of Civil Engineering.
J. O. Duru, H. N. Holtan, and R. L. Green.
Transactions of the American Society of Agricultural Engineers, Vol 17, No 5, p 922-926, September-October 1974. 9 fig, 1 tab, 16 ref.

Descriptors: *Hydrograph analysis, *Evapotranspiration, Recession curves, Runoff, Precipitation(Atmospheric), Streams, Hydrographs, Theoretical analysis.
Identifiers: *Recession limb, Recession flows.

The structure of discharge-recession curves was investigated starting with a 1939 reference that states that the recession limb of a hydrograph is comprised of surface runoff, interflow, and groundwater components in variable proportions with the surface runoff component close to the hydrograph peak. The exponential equation developed in the 1939 paper would produce a

unique recession curve for every watershed. observations differ from this theory because evapotranspiration losses from a watershed are seasonal and have a variable effect on the slopes of recession curves. The premise was that the streamflow recession reflects watershed physical characteristics so that each watershed has its unique recession curve. The recession equation of 1939 was modified to permit the synthesis of the watershed standard curve given an observed recession curve for the watershed and evapotranspiration loss rates during the recession period. An equation was developed that permitted the routing of subsurface flow while simultaneously adjusting the routed recession for evapotranspiration losses. (Roberts-ISWS)
W75-04712

ROTATING HYDRAULICS OF STRAIT AND SILL FLOWS,
Woods Hole Oceanographic Institution, Massachusetts.
For primary bibliographic entry see Field 2L.
W75-04716

THE PROBLEM OF THE INFLUENCE OF OCEAN CURRENTS ON FREE INTERNAL GRAVITY WAVES,
For primary bibliographic entry see Field 2L.
W75-04739

FLOOD PLAIN INFORMATION: SHUNGANUNGA CREEK, TOPEKA, KANSAS.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-04751

CHANNEL FLOW DRIVEN BY A STATIONARY THERMAL SOURCE,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 8B.
W75-04793

AN ALTERNATIVE FORMULATION OF THE PROBLEM OF DENSITY JUMP,
Sargent and Lundy, Chicago, Ill.
For primary bibliographic entry see Field 8B.
W75-04797

SURFACE WATER DATA OF THE LLANO TEXAS REGION, PROJECT SANGUINE.
EDAW, Inc., San Francisco, Calif.
Available from the National Technical Information Service, Springfield, Va. 22161 as AD-780 254. Paper copy $3.75, microfiche $2.25. November 1973. 38 p, 1 tab, 23 ref, 3 append. Contract N62472-73-C-1056.

Descriptors: Hydrology, *Rainfall, *Runoff, Topography, Surface waters, Streams, Drainage, Discharge measurement, Streamflow, Cross-sections, *Texas, Water quality, Colorado River, On-site data collections.
Identifiers: San Saba River(Tex), Llano River(Tex), Pedernales River(Tex).

The only large streams that cross the Llano, Texas study area are the southward-flowing Colorado River and its three eastward-flowing tributaries - the San Saba, Llano, and Pedernales Rivers. The study area is located on a relatively old geologic/topographic surface with a highly developed stream net. This type of drainage, along with climatic conditions that include sporadic periods of heavy rainfall, results in 'flashy' stream performance. The quality of the water in streams in the area is generally good, but it is quite hard. The Llano River at low flow has a TDS of only about 250 ppm, while perennial tributaries have a TDS of 350 ppm. Bedrock is shallow and the streams do not scour to great depths. Surface water is diverted and pumped for irrigation and used as a municipal water supply in a few cities. Water quality does not appear to have deteriorated within the period of measurement and it will not change unless large quantities of waste water are discharged into the streams. (Dawes-ISWS)
W75-04847

2F. Groundwater

RADIOCARBON, CARBON-13 AND TRITIUM IN WATER SAMPLES FROM BASALTIC AQUIFERS AND CARBONATE AQUIFERS ON THE ISLAND OF OAHU, HAWAII,
Hawaii Inst. of Geophysics, Honolulu.
T. H. Hufen, R. W. Buddemeier, and L. S. Lau.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 239 410, $3.25 paper copy, $2.25 microfiche. Paper IAEA/SM-182/33, presented at International Atomic Energy Agency Symposium, Vienna, Australia. February 1974. 18 p, 5 fig, 2 tab, 15 ref. OWRT B-030-HI(1), 14-31-0001-3875.

Descriptors: *Hawaii, *Water sampling, *Carbon radioisotopes, Groundwater, Age, *Groundwater movement, Isotopes, *Tritium, Confined water, Aquifers, Carbonates, Pumping, Recharge, Basalts, Piezometry.
Identifiers: *Carbon-13, Basal groundwater, *Basaltic aquifers, Liquid scintillation counting, *Oahu(H.I.), *Carbonate aquifers.

Principal fresh water aquifers on the subtropical island of Oahu consist of basaltic rocks that are devoid of fossil carbonate minerals. In southern Oahu fresh water occurs as semi-independent basal lenses which float on salt water and are bounded by sedimentary formations along the coast and in valley bottoms. The latter formations contain carbonate aquifers. Fresh water also occurs in dike compartments located in the central parts of the mountains. The radiocarbon content of groundwater recharge on Oahu is between 96 and 100% modern. The carbon-13 concentration associated with fresh groundwater is between -17 and -19 deviations per mil from the PDB standard, and remains constant while such waters reside in, or travel through, basaltic rock aquifers. Radiocarbon and tritium data on basal waters withdrawn by major pumping stations show these waters to have ages between a few decades and several hundred years. Differences in these ages relate systematically to individual pumping rates of the stations, well depths and local lens thickness.
W75-04441

CONTROLS ON THE QUALITY VARIATIONS OF SOME CARBONATE SPRING WATERS,
Goettingen Univ. (West Germany). Sediment-Petrographisches Institut.
R. L. Jacobson, and D. Langmuir.
Journal of Hydrology, Vol 23, No 3/4, p 247-265, December 1974. 10 fig, 5 tab, 29 ref.

Descriptors: *Geochemistry, *Carbonate rocks, *Springs, *Hydrogeology, Discharge(Water), Spring waters, Water chemistry, Geologic control, Solutes, Subsurface runoff, Dissolved solids, Infiltration, Groundwater movement, Hydrographs, Storms, Recharge, Specific conductivity, Equilibrium, Statistics, *Pennsylvania, *Water quality control.
Identifiers: *Nittany Valley(Pa), Diffuse flow, Conduit flow.

In carbonate-rock terranes i central Pennsylvania, a spring's discharge characteristics and water chemistry can be predicted from its geographic and hydrogeologic setting. Springs located near non-carbonate ridges (conduit-type) receive much of their recharge as mountain runoff entering sinkholes, have waters low in solutes, and have a large variability in water quality and discharge. Springs in mid-valley areas (diffuse-type) receive water chiefly by infiltration through soils, or from a deeper circulating groundwater flow system, and discharge water with higher total dissolved solids (TDS) and less variation in solute amounts and discharge. A spring's flow is a much more important control on its water chemistry than is season, particularly for diffuse-type springs. In conduit spring waters, TDS increase in the early part of the storm hydrograph, decrease during the middle of the storm peak because of recharge via sinkholes, and finally increase as the storm pulse dissipates. In diffuse spring waters TDS increase and decrease nearly simultaneously with discharge following a storm as infiltration through soils near the spring leaches salts to the groundwater table. Based on precipitation and discharge records, it took 6 and 60 days, respectively, for 50% of the groundwater introduced following a storm to leave a conduit and a diffuse type spring system. (Visocky-ISWS)
W75-04710

GROUNDWATER PUMPAGE IN NORTHERN ILLINOIS, 1960-1970,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 4B.
W75-04727

2G. Water In Soils

DISTRIBUTION OF DIFFERENT FORMS OF NITROGEN IN SOME DESERT SOILS,
California Univ., Los Angeles.
H. Nishita, and R. M. Haug.
Soil Science, Vol 116, No 1, p 51-58, July, 1973. 6 tab, 35 ref.

Descriptors: *Nitrogen, *Nitrification, *Deserts, *Vegetation effects, Nitrogen fixation, Nitrogen compounds, Soil chemical properties, Alkalinity, Organic compounds, Inorganic compounds.

Several desert soils were studied to determine the contents and distributions of different forms of nitrogen. Soil profiles were sampled in 7.6 cm increments to various depths with a maximum depth of 91.4 cm. All of the soils examined were of alkaline reaction since nitrification is favored by a pH above neutral. Total nitrogen was greatest in the surface layer (0.0-7.6 cm.) and usually decreased sharply in the second layer. The order of the different nitrogen forms in the surface layers of soils was (organic N)>(fixed NH4+-N)>(NO3--N)>(extractable NH4+-N)>(NO2--N). The fixation of NH4+-N was lower in the soil under plants than in the bare soil. The nitrogen content in the soil was influenced by plant species. (Mastic-Arizona)
W75-04373

CALCULATION OF THE DRAINAGE COMPONENT OF SOIL WATER DEPLETION,
Agricultural Research Service, Prosser, Wash.
D. W. Miller, and J. S. Aarstad.
Soil Science, Vol 118, No 1, p 11-15, July, 1974. 1 tab, 2 fig, 9 ref.

Descriptors: *Evapotranspiration, *Soil water, *Drainage, *Irrigation, Soil texture, Field capacity, Soil water movement, Wetting.
Identifiers: Soil water depletion.

The relationship between soil water content and drainage was studied under conditions of no evapotranspiration. Drainage was calculated for a range of evapotranspiration rates under the assumption that for a given cropped soil, the drainage rate was a function of water content and independent of water uptake by plants. A close correlation between measured and calculated soil water depletion was obtained with three soils ranging in texture from sand to silt loam and at transpiration rates of 0.4 to 1.3 centimeters per day. The proportion of total depletion due to evapotranspiration increases as evapotranspiration increases. (Mastic-Arizona)

W75-04374

INFILTRATION FOR THREE RANGELAND SOIL-VEGETATION COMPLEXES,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center; and Soil Conservation Service, Phoenix, Ariz.
J. R. Tromble, K. G. Renard, and A. P. Thatcher.
Journal of Range Management, Vol 27, No 4, p 318-321, July, 1974. 3 tab, 2 fig, 8 ref.

Descriptors: *Infiltration, *Grasses, *Rainfall simulators, *Soil-water-plant relationships, *Watershed management, Infiltrometers, Runoff, Brush, Grazing, Arizona, Hydrologic properties, Soil types, Soil surfaces.
Identifiers: Walnut Gulch Experimental Watershed.

A rainfall simulator was used to examine infiltration-runoff relations as influenced by three typical soil-vegetation complexes on rangeland sites in southeastern Arizona. These sites were selected in order to quantify differences in infiltration and runoff encountered on three major rangeland soil with brush, grass, or no vegetation and to examine infiltration variability encountered on different hydrological soil groups. Soil moisture content was low at all sites as a result of below normal precipitation during the preceeding 4 months. Infiltration was higher on brush than on ungrazed grass plots, and higher on ungrazed grass plots than on grazed grass plots. Infiltration decreased significantly with base soil. On brush-dominated plots more litter was present providing soil conditions more amenable to infiltration. Approximately twice as much crown cover was measured on brush plots as on grass plots providing more soil protection and improving infiltration. (Mastic-Arizona)
W75-04377

THE TEMPERATURE PROFILES OF SOIL COLUMNS DURING INFILTRATION,
Sydney Univ. (Australia). Dept. of Soil Science.
N. Collis-George, and R. Lal.
Australian Journal of Soil Research, Vol 11, No 1, p 93-105, March 1973. 3 tab, 2 fig, 11 ref.

Descriptors: *Infiltration, *Soil moisture, *Heat balance, *Thermal conductivity, *Soil profiles, Temperature, Soil aggregates, *Heat transfer, Isotherms, Thermodynamics, Radiation, Vapor pressure, Condensation, Convection, Diffusion, Water vapor, Wetting.

An attempt was made to gather more quantitative evidence to ascertain the role played by heat of wetting on infiltration behavior in columns of two soil aggregates at two initial moisture regimes. A temperature front produced during infiltration can be divided into zones: (a) a zone of vapor condensation and temperature rise, (b) a zone between (a) and (c) where temperature falls and heat is lost by conduction to the liquid wetting front, and (c) a zone starting at the liquid wetting front and with temperature decreasing to ambient. Mechanisms of vapor diffusion, liquid flow, heat conduction, and heat transport that occur qualitatively explain all observed results. Heat balance procedures are used to show that the thermodynamic heat of wetting obtained from the absorption isotherms is the dominant quantity in each experiment. Results are discussed in terms of infiltration into unstable soils. (Mastic-Arizona)
W75-04389

THE CLASSIFICATION OF SOME NIGERIAN SOILS,
Wisconsin Univ.-Stevens Point.
M. I. Harpstead.
Soil Science, Vol 116, No 6, p 437-443, December, 1973. 1 fig, 3 tab, 15 ref.

Descriptors: *Soil classification, *Soil formation, *Soil structure, *Land use, Soil type, Soil texture, Vegetation, Aeolian soils, Soil physical properties, Soil chemical properties, Soil profiles.
Identifiers: *Nigeria.

Soil profile samples from eleven sites in Nigeria were studied for soil classification. Samples were widely distributed from the high rainfall coastal area of sedimentary parent material to the dry northern area where aeolian deposits from the Sahara Desert have been the major soil forming factor. Soils were classified according to the USDA system of soil classification. Soils with weatherable minerals formed from crystalline rocks were mainly classified as alfisols. Those soils formed from sedimentary rocks and ultrabasic crystalline rocks are oxisols. Soils derived from aeolian parent material and the Pleistocene sediments are classified as inceptosols. Location, soil classification, vegetation, type present, parent material, probable age, and some morphological characteristics are given. This study was undertaken as a basic soil survey to aid in land use planning necessary for meeting the great demand being placed on the soil to meet the food and fiber needs of a rapidly expanding population. (Mastic-Arizona)
W75-04390

OVERSATURATION METHOD FOR PREPARING SATURATION EXTRACTS FOR SALINITY APPRAISAL,
Agricultural Research Service, Chickasha, Okla.
L. E. Allison.
Soil Science, Vol 116, No 2, p 65-69, August, 1973. 3 fig, 1 tab, 5 ref.

Descriptors: *Saturated soils, *Saturation, *Soil water, *Puddling, Salinity, Field capacity, Soil texture, Soil horizons.

A new method for preparing saturated extracts of salt-affected soils is described. Soil saturation is achieved by means of oversaturation rather than from a dry soil. The method offers saving in time and labor of preparing saturated pastes for extraction and analysis. The oversaturation technique offers two main advantages over the standard procedure; it avoids the necessity of repeated adding and mixing of increments of water into a sticky soil mass that develops long before saturation is attained, and it prevents the puddling effect that occurs when fine-textured soils are mixed at a water content near field capacity. An effective test for the end point of saturation and some modern extraction equipment are described. (Mastic-Arizona)
W75-04392

THE UNRELIABILITY OF TILE EFFLUENT FOR MONITORING SUBSURFACE NITRATE-NITROGEN LOSSES FROM SOILS,
For primary bibliographic entry see Field 5B.
W75-04438

EFFECT OF QUALITIES OF IRRIGATION WATER AND FERTILIZERS ON SOIL PROPERTIES, YIELD AND NUTRIENT UPTAKE BY WHEAT,
S.K.N. Coll. of Agriculture, Jobner (India). Dept. of Agricultural Chemistry and Soil Science.
For primary bibliographic entry see Field 3F.
W75-04482

SUSCEPTIBILITY OF GRAIN SORGHUM TO WATER DEFICIT AT THREE GROWTH STAGES,
Texas A and M Univ., College Station. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 3F.
W75-04483

EVALUATION OF THE FILTER PAPER METHOD FOR ESTIMATING SOIL WATER POTENTIAL,
Utah State Univ., Logan.
S. Al-Khafaf, and R. J. Hanks.
Soil Sci, Vol 117, No 4, p 194-199, 1974, Illus.
Identifiers: *Filter paper method, Flow, Liquids, Psychrometers, Soil temperature, Thermocouples, *Soil water potential, Water vapor, Estimating.

The method was calibrated using salt solutions, thermocouple psychrometer, pressure plates and soil columns at equilibrium. The predicted water potential was influenced by the type of contact of the soil with the filter paper. It is suggested that 1 filter paper be placed beneath the soil (good contact for liquid flow and vapor flow) and another above the soil not in physical contact (allowing vapor flow only). The absolute temperature was not too important but temperature variations had a large effect on the producted soil water potential.--Copyright 1974, Biological Abstracts, Inc.
W75-04506

TRICKLE IRRIGATION SOIL WATER POTENTIAL AS INFLUENCED BY MANAGEMENT OF HIGHLY SALINE WATER,
Utah State Univ., Logan.
P. Tscheschke, J. F. Alfaro, J. Keller, and R. J. Hanks.
Soil Sci, Vol 117, No 4, p 226-231, 1974, Illus.
Identifiers: Evapotranspiration, Irrigation, Management, *Saline water, *Soil water potential, Tomato, Transpiration, *Trickle irrigation, Crop production.

Although trickle irrigation offers the possibility of obtaining comparatively good yields when nontoxic highly saline water is used for irrigation, the subsequent accumulation of salts in the root zone is a potential hazard that should not be disregarded. The soil water potential and salt patterns in uniform soil profiles as a result of 4 different water management treatments were determined. Under these treatments cherry tomato plants were irrigated daily with a volume of water equal to that used by the plant on the previous day, every other day with volumes of water equal, below, and above the water evapotranspired. In general, the soil water potential decreased in the soil profile, as a result of salt accumulation, with increased distance from the trickle source. In the profiles where the wetting fronts reached the mid-region between the emitters much lower soil water potentials were measured near the soil surface. The highest salt concentration occurred in the profiles irrigated with volumes of water below that evapotranspired by the tomato plants, indicating the importance of avoiding under irrigation whenever highly saline water is used with trickle irrigation. Higher soil water potentials and higher yields resulted from irrigating with volumes above the evapotranspiration.--Copyright 1974, Biological Abstracts, Inc.
W75-04507

MECHANISM OF FIRE-INDUCED WATER REPELLENCY IN SOIL,
S. M. Savage.
Soil Science Society of America, Proceedings, Vol 38, July-August 1974. p 652-657, 4 tab, 3 fig, 8 ref.

Descriptors: *Litter, *Soil temperature, *Heat, *Burning, Organic compounds, Forest fires, Sands, Volatility.
Identifiers: *Water-repellency, Hydrophobic substances, Thermocouple.

The distribution, chemistry, and reaction of substances released from the organic litter layer as a result of wildfire which creates water-repellent soils were studied. The formation of water-repellent soil can cause serious erosion and delay revegetation of the burned areas. Organic soil litter collected under Manzanita (Arctoslaphylos sp.) was burned over a sand column. In one case the

burned litter was allowed to remain until cool, in the other, the litter was removed at once. Results showed that maximum temperatures were reached when the litter remained. The movement of organic substances occurs during the fire, and after burning heat moves into the sand 'fixing' some of the more polar hydrophobic substances and revolitilizing the less polar substances, thus broadening the water-repellent layer. Temperatures required for these processes appeared to be greater than 250C. (Mastic-Arizona)
W75-04515

SALT AND WATER MOVEMENT IN RELATIVELY DRY SOIL,
Papua and New Guinea Univ., Port Moresby (New Guinea). Dept. of Physics.
D. R. Scotter.
Australian Journal of Soil Research, Vol 12, No 1, March 1974. p 27-35, 6 fig, 11 ref.

Descriptors: *Salts, *Soil water movement, *Diffusivity, Soil moisture, Fertilizers, Gravitational water, Model studies.
Identifiers: *Water potential, Parlange theory.

The Parlange theory of relatively dry soil salt and water movements was studied. Data on water potentials and water and salt diffusivities as functions of water content for the particular soil used are neccessary. When dry crystalline salt is placed on a relatively dry soil, water accumulates in the soil directly adjacent to the salt, and dissolved salt moves into the wetter area. Results show the theory to have some limited success in predicting salt movement into the soil, but to inadequately explain the water distribution in the wetter area adjacent to the crystalline salt. To account for the discrepancy between the measured and calculated water diffusivity, it is suggested that there is significant water movement in the vapor phase which is not accounted for in the theory. (Mastic-Arizona)
W75-04516

THE EFFECT OF INITIAL MOISTURE CONTENT AND INFILTRATION QUANTITY OF REDISTRIBUTION OF SOIL WATER,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Environmental Mechanics.
T. Talsma.
Australian Journal of Soil Research, Vol 12, No 1, March 1974. p 15-26, 8 fig, 2 tab, 11 ref.

Descriptors: *Infiltration, *Soil moisture, *Moisture content, *Drainage, *Water distribution, Irrigation, Sands, Loam, Capillary water, Capillary conductivity, Gravitational water, Soils, Transition flow.
Identifiers: Moisture profiles.

Experimental data were obtained to verify several studies that describe the redistribution of water in uniformly moist, inert, porous material, after irrigation has ceased. Initial moisture content and infiltration quantity were studies in loam, fine sand, and coarse sand. Moisture profiles were obtained during redistribution by gamma ray attenuation. Measured values of the hydraulic properties of the soils were used to calculate fluxes at the transition from drainage to wetting. Gravity effects dominated in both sands, while capillary effects at smaller initial moisture contents and infiltration quantities dominated in the loam. In all soils, increased initial moisture quantities or infiltration quantity was directly related to the increased contribution of gravity to the flux, and decreased contribution of capillarity. In any particular material, it depends on the magnitude of these fluxes whether mean moisture contents in the drainage zone will be higher or lower at increasing values of initial moisture content or infiltration quantity. (Mastic-Arizona)
W75-04517

THE EFFECT OF SOIL TEXTURE AND DENSITY ON THE NEUTRON AND DENSITY PROBE CALIBRATION FOR SOME TROPICAL SOILS,
International Inst. of Tropical Agriculture, Ibadan (Nigeria).
R. Lal.
Soil Sci 117(4): 183-190, Illus. 1974.
Identifiers: Calibration, *Density probes, Moisture, *Neutron probes, *Soil texture, Soils, *Tropical soils, Ferrallitic soils, Instrumentation, *Soil density.

The effect of soil texture and bulk density on calibration of neutron moisture and density probes was investigated for 5 tropical ferrallitic soils. Soil texture and bulk density had a significant effect on the neutron probe calibration. Fine-textured soil with high content of extractable Fe had an intercept of 0.465 as compared to 0.044 for coarse-textured soil. For 20% volumetric moisture content the count ratio changed from 0.568 for dry density of 1.0 g cm-3 to 0.943 with twice the value of soil density. Similarly, texture and initial moisture content significantly influenced the density probe calibration. Therefore, widespread heterogeneity of tropical soils limits the usefulness of the neutron-scattering technique as routine method of monitoring soil moisture regimes.--Copyright 1974, Biological Abstracts, Inc.
W75-04549

COMPARATIVE CHANGES IN SOIL-PHYSICAL PROPERTIES INDUCED BY ADMIXTURES OF MANURES FROM VARIOUS DOMESTIC ANIMALS,
California Univ., Davis.
A. A. R. Hafez.
Soil Science, Vol 118, No 1, p 53-59, July, 1974. 7 tab, 2 fig, 9 ref.

Descriptors: *Soil physical properties, *Organic wastes, *Hydraulic conductivity, *Fertilizers, *Farm wastes, Permeability, Bulk density, Soil aggregates, Soil types, Soil texture, Soil strength, Soil water movement, Moisture content, Compaction, Shrinkage, Cattle.
Identifiers: Horses.

Changes in some properties of soils were observed following the addition of manures from domestic animals. Bulk densities were decreased in a fine sandy loam soil. Water holding capacities of both sandy and clay soils were increased in proportion to quantities of manure added. Water flow through saturated soils was dramatically enhanced by the fibrous components of beef cattle and horse manures, whereas poultry manures gave little or no response. Addition of animal manure induced water-stable soil particle aggregation and higher shrinkage limits in a clay soil. Soil strength was reduced progressively with increased rates of admixed manure. There was strong evidence to support the proposition that the fibrosity of manures might have important bearing on the degree of hydraulic conductivity that may be induced in improvements in physical properties in soils, whereas the organic component is mainly responsible for increases in the water holding capacities. (Mastic-Arizona)
W75-04602

A NONDESTRUCTIVE METHOD OF FOLLOWING MOISTURE CONTENT AND TEMPERATURE CHANGES IN SOILS USING THERMISTORS,
Sydney Univ. (Australia). Dept. of Soil Science.
P. M. Cornish, K. B. Laryea, and B. J. Bridge.
Soil Science, Vol 115, No 4, p 309-314, April, 1973. 2 tab, 4 fig, 11 ref.

Descriptors: *Soil moisture, *Soil moisture meters, *Soil temperature, *Thermal conductivity, *Moisture content, Soil structure, Potentiometers, Calibrations, Infiltration, Evaporation, Bulk density, Soil physical properties, Wetting, Instrumentation.
Identifiers: Thermistors, Wheatstone bridge circuit.

Thermistors are embedded directly in the soil, and functioning as both heating elements and sensors, respond to changes in thermal conductivity of the soil as water content changes. The thermistors are used in a Wheatstone Bridge circuit as part of a nondestructive method for following moisture content changes in soil materials. Following calibration for the particular soil material, the method allows moisture contents to be monitored in experiments involving both evaporation and infiltration where changes in bulk density and particle geometry are not extreme. The bridge circuits and thermistors can also be sued to measure soil temperature when the thermistors have been calibrated. (Mastic-Arizona)
W75-04605

THE COMBINED EFFECTS OF INFILTRATION AND REDISTRIBUTION ON LEACHING,
California Univ., Davis.
C. Kirda, D. R. Nielsen, and J. W. Biggar.
Soil Science, Vol 117, No 6, p 323-330, June, 1974. 1 tab, 6 fig, 82 ref.

Descriptors: *Leaching, *Soil water movement, *Infiltration, *Sprinkler irrigation, *Hydraulic conductivity, Chlorides, Soil water, Salts, Hysteresis, Soil surfaces, Rainfall, Irrigation, Soil types, Soil profiles.

Nondestructive measurements were used to examine simultaneous transport of chloride and water for infiltration and redistribution within soil columns. The objective was to evaluate whether water content at the surface and the initial soil water content cause appreciable differences in the leaching process. Water application methods yielding small average soil water contents during infiltration leached the chloride efficiently to relatively great depths. Initial soil water content did not have any appreciable effect on leaching during infiltration, but the smaller the initial soil water content present, the displacement of chloride during redistribution was deeper and more complete. (Mastic-Arizona)
W75-04606

POLYVINYL ALCOHOL AS A STABILIZER OF SURFACE SOIL,
Waite Agricultural Research Inst., Glen Osmond (Australia).
R. C. Stefanson.
Soil Science, Vol 115, No 6, p 420-427, June, 1973. 6 tab, 5 fig, 15 ref.

Descriptors: *Soil surfaces, *Rainfall, *Simultated rainfall, *Soil water, *Biodegradation, Soil stabilization, Plant growth, Organic matter, Soil types, Soil structures, Infiltration, Moisture content, Hydrolysis, Chemical properties, Chemicals.
Identifiers: *Polyvinyl alcohol, PVA.

Polyvinyl alcohol (PVA) is shown to be an effective stabilizer of surface soils when soil organic matter maintains the structural organization of the soil. In three out of four soils studied, rainfall acceptance could be doubled by adding 0.005% w/w of PVA to the 0-2 cm. layer of soil in an undisturbed core. The use of an optimal-sized polymer and application to wet soil improved the efficiency of stabilization. Additional factors that were studied included the effect of the method and rate of application, the molecular weight and degree of hydrolysis of PVA, the importance of soil type, and the effect of plant growth. When the PVA was applied to cores which had recently supported plant growth, the acceptance of rainfall was reduced. PVA appears to be resistant to biodegradation in undisturbed soils, but confirmation with c14 labeled PVA will be necessary. (Mastic-Arizona)
W75-04607

MICROMORPHOLOGY. A DISCIPLINE AT THE CHEMISTRY-MINEROLOGY INTERFACE,
Commonwealth Scientific and Industrial Research Organization, Glen Osmond (Australia). Div. of Soils.
R. Brewer.
Soil Science, Vol 115, No 3, p 261-266, March, 1973. 29 ref.

Descriptors: *Soil chemical properties, *Soil chemistry, *Percolation, *Soil water, *Weathering, Microscopy, Mineralogy, Soil profiles, Soil formation, Soil physical properties, X-ray diffraction.
Identifiers: Micromorphology, Microhydrology.

In terms of pedology, micromorphology deals specifically with the study of thin sections of soil materials using a polarized light microscope. Micromorphology can be useful as an intermediate step in chemical-mineralogical studies where the distribution of mineral constituents can be observed and used for interpreting chemical processes. These processes that may be analyzed include, mineral weathering for use in determining chemical histories of soils, concentration of mineral species to interpret specific pedological features in therms of specific chemical processes, and, the effects on profile chemistry to determine the effects of pedological features on soil solutions percolating through, including wetting and drying patters and rates of movement of solutions. This discussion infers that the full potential of micromorphology has not been realized; and that a reason might be the general lack of attempts to correlate microscopic data with chemical and mineralogical data. (Mastic-Arizona)
W75-04608

CHARACTERISTICS AND SOIL TREATMENT OF BIOLOGICALLY TREATED SWINE WASTES, VOL. I, CH.1 THRU 3,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 5D.
W75-04623

CHARACTERISTICS AND SOIL TREATMENT OF BIOLOGICALLY TREATED SWINE WASTE, VOL II, CH. 4, THRU 7,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 5D.
W75-04624

SIMULATION OF MOISTURE TRANSFER IN SOILS: ONE-DIMENSIONAL INFILTRATION,
Goettingen Univ. (West Germany). Inst. of Soil Science and Forest Nutrition.
R. R. Van der Ploeg.
Soil Science, Vol 118, No 6, p 349-357, December 1974. 3 fig, 2 tab, 8 ref.

Descriptors: *Soil moisture, *Soil water movement, *Infiltration rates, *Unsaturated flow, Computer models, Computer programs, Profiles, Soils, Darcys law, Infiltration, Permeability, Model studies, Evaporation, Moisture content, Water transfer, Simulation analysis.
Identifiers: *Yolo light clay, One-dimensional infiltration.

A simulation program for a digital computer was developed to calculate the soil moisture profile, the infiltration rate, and the cumulative infiltration under conditions of one-dimensional, vertical unsteady infiltration into soil. The simulation program does not require an advanced mathematical knowledge, nor does it require much computer programming skill. The results of the simulation technique were compared with existing solutions for one-dimensional infiltration for Yolo light clay, and good agreement was found. The simulation program does not require a uniform soil or an initially uniformly distributed moisture content in the soil. It can be easily changed to include evaporation from soil. Due to its simplicity the simulation program that was developed may be more appealing than existing techniques to calculate moisture profiles, infiltration rates, and cumulative infiltration. (Sanderson-ISWS)
W75-04695

STRESS-STRAIN RESPONSE FOR SAND,
Punjab Agricultural Univ., Ludhiana (India).
For primary bibliographic entry see Field 8D.
W75-04696

A LEAK-PROOF SAMPLING PORT IN GAS ANALYSES STUDIES,
Guelph Univ., (Ontario). Dept. of Land Resource Science.
For primary bibliographic entry see Field 7B.
W75-04697

A METHOD FOR MEASURING FIRST-STAGE SOIL WATER EVAPORATION IN THE FIELD,
Agricultural Research Service, Temple, Tex. Blackland Conservation Research Center.
For primary bibliographic entry see Field 2D.
W75-04698

FEEDLOT WASTE EFFECTS ON SOIL CONDITIONS AND WATER EVAPORATION,
Southwestern Great Plains Research Center, Bushland, Tex.
For primary bibliographic entry see Field 5B.
W75-04699

TWO-DIMENSIONAL WATER INFILTRATION FROM A TRENCH IN UNSATURATED SOILS,
Connecticut Agricultural Experiment Station, New Haven.
B. L. Sawhney, and J-Y. Parlange.
Soil Science Society of America Proceedings, Vol 38, No 6, p 867-871, November-December, 1974. 8 fig, 2 tab, 10 ref.

Descriptors: *Soil moisture, *Soil water movement, *Unsaturated flow, *Infiltration rates, Diffusion, Sorption, Conductivity, Model studies, Water transfer, Soils, Soil disposal fields, Flow rates.
Identifiers: Moisture profiles, Wetting fronts.

Two-dimensional infiltration of water from finite trenches was observed in three soil samples with different textures. The vertical infiltration was slowed by the lateral infiltration and the slowing was inversely proportional to the width of the trench. Furthermore, the vertical infiltration was about twice as fast as the lateral infiltration for all soils tested. At the same relative distance from the trench, the soil was drier beside than below the trench. These observations and interpretations agreed with the numerical simulations of Selim and Kirkham. (Gibb-ISWS)
W75-04700

UNSTEADY, UNSATURATED, N-DIMENSIONAL MOISTURE FLOW IN SOIL: A COMPUTER SIMULATION PROGRAM,
Goettingen Univ. (West Germany).
R. R. Van der Ploeg, and P. Benecke.
Soil Science Society of America Proceedings, Vol 38, No 6, p 881-885, November-December 1974. 7 fig, 1 tab, 15 ref.

Descriptors: *Soil moisture, *Soil water movement, *Infiltration rates, *Unsatured flow, *Computer models, Water transfer, Soils, Darcys law, Infiltration, Permeability, Model studies, Evaporation, Diffusivity, Moisture content, *Simulation analysis.
Identifiers: Yolo light clay, Nahal Sinai sand, Gilat loam.

A computer simulation program for predicting n-dimensional moisture flow in soils was tested and presented. The programming was done with the computer program System/360 Continuous System Modeling Program (CSMP). The program is simple and does not require an extensive mathematical background. Sample problems dealing with one-dimensional absorption, spherical absorption, two-dimensional infiltration from a line source, and three-dimensional infiltration from a trickle source compared well with existing solutions. The accuracy of the simulation results is sufficiently high for most purposes, where quantitative answers about soil moisture dynamics are needed. (Gibb-ISWS)
W75-04701

LYSIMETER EXPERIMENT DESCRIPTION AND PROGRESS REPORT ON NEUTRON MEASUREMENTS,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 2D.
W75-04725

RATIONAL BASIS FOR SEPTIC TANK SYSTEM DESIGN,
Connecticut Univ., Storrs. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-04801

UNIFORM DISTRIBUTION IN SOIL ABSORPTION FIELDS,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5D.
W75-04807

2H. Lakes

AN ECOLOGICAL STUDY OF A BALD-CYPRESS SWAMP IN ST. CHARLES PARISH, LOUISIANA,
Army Engineer District, New Orleans, La.
G. N. Montz, and A. Cherubini.
Castanea, Vol 38, No 4, p 378-386, 1973.
Identifiers: Alternanthera-philoxeroides, *Baldcypress, *Ecological studies, *Louisiana(St. Charles Parish), *Swamps, Taxodium-distichum, *Alligator weeds, Marshes.

A baldcypress (Taxodium distichum (L.) Richard) swamp bordering a marsh in St. Charles Parish was studied by the quadrat method. A dense undergrowth of alligator weed (Alternathera philoxeroides (Mart) Griseb.) covered most of the study area. Plant succession with extension of baldcypress into the marsh was studied by comparing townships maps of 1860 and quadrangle maps of 1955 and 1957 to quadrangle maps of 1969. Only baldcypress was recorded, with tree diameters increasing from the marsh-swamp zone into the swamp. Of the 639 trees recorded in the study area, 357 were dead.--Copyright 1974, Biological Abstracts, Inc.
W75-04364

TEMPERATURE MEASUREMENTS AND INTERNAL WAVES IN SENACA LAKE, NEW YORK,
Lamont-Doherty Geological Observatory, Palisades, N.Y.
M. H. Fliegel.
Available from NTIS, Springfield, Va 22161 as AD-769 227, $5.75 in paper copy, $2.25 in microfiche. Tech. Rept. No. 9, Oct. 1973. 146 p, 66 fig, 6 tab, 26 ref.

Descriptors: *Measurement, *Temperature, *Lakes, *New York, *Waves(Water), Internal waves, Frequency, Wind times, Heat budget,

Heat balance, Heat transfer, Thermal capacity, Seasonal, Dynamics.
Identifiers: *Seneca Lake(NY), Wave direction.

Temperatures were measured near the center of Seneca Lake with thermistors and bathythermographs during four different years. Seneca Lake is a long, narrow, deep lake in the Finger Lakes region of western central New York state, with a temperature structure similar to that of many oceans. The bathythermograph records, which were used to reconstruct the annual temperature cycle of the lake, indicate that it is freely circulating throughout much of the winter although its temperature is below 4C. The annual heat budget was estimated to range between 40,000 and 47,000 cal./cm sq for most years. Amplitude and directional data are given for internal waves. (Houser-ORNL)
W75-04400

DIURNAL TEMPERATURE DISTRIBUTION IN SMALL RESERVOIR,
Missouri Univ., Rolla. Dept. of Mechanical and Aerospace Engineering.
F. Armaly.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 239 402, $4.25 paper copy, $2.25 microfiche. Completion Report, January 17, 1975. 31 p, 11 fig, 1 tab, 33 ref. OWRT A-080-MO (1), 14-31-0001-4025.

Descriptors: *Reservoirs, *Diurnal distribution, *Thermocline, Model studies, *Stratification, *Water temperature, Impoundments, Absorption, Solar radiation, Evaporation, Convection, Attenuation, Heating, Cooling.
Identifiers: *Solar energy.

The diurnal temperature distribution in a deep water impoundment which is exposed to heating and cooling loads by convection, evaporation and radiation is examined. The diurnal behavior of the solar load, directional and spectral, is used with the selective attenuation and reflection characteristics of the water to account for the internal solar energy absorption rate. Simple atmospheric and water attenuation models were used to examine and simulate the diurnal behavior. The results demonstrate the stratification developments of the reservoir and indicate that in some cases deep layer responds continuously to the diurnal fluctuations of surface energy loads.
W75-04443

BIOLOGIC DETECTION AND CONTROL OF WATER POLLUTION,
Clemson Univ., S. C. Dept. of Microbiology.
For primary bibliographic entry see Field 5C.
W75-04447

INTERRELATIONS BETWEEN SULFATE-REDUCING AND METHANE-PRODUCING BACTERIA IN BOTTOM DEPOSITS OF A FRESH-WATER LAKE. I. FIELD OBSERVATIONS,
Hydrobiologisch Institutt, Nieuwersluis (Netherlands).
For primary bibliographic entry see Field 5C.
W75-04469

INTERRELATIONS BETWEEN SULFATE-REDUCING AND METHANE-PRODUCING BACTERIA IN BOTTOM DEPOSITS OF A FRESH-WATER LAKE. II. INHIBITION EXPERIMENTS,
Hydrobiologisch Institutt, Nieuwersluis (Netherlands).
For primary bibliographic entry see Field 5C.
W75-04470

INFLUENCE OF FRESHWATER DULUTION ON DYNAMICS OF POPULATIONS OF BUILDER CRUSTACEANS FROM LAGOON OF BIGUGLIA, CORSICA (COROPHIUM INSIDIOSUM C., TANAIS CAVOLINII M.E., ERICHTHONIUS BRASILIENSIS D.), (IN FRENCH),
Centre d'Oceanographie, Marseille (France). Station Marine d'Endoume.
M-L. De Casabianca.
Identifiers: Corophium-insidiosum, *Corsica(Lagoon of Biguglia), *Crustaceans, Density, Dilution, Erichthonius-brasiliensis, Lagoons, Microdeutopus-gryllotalpa, Rain, *Salinity, Tanais-cavolinii, Winter, Lakes, *Brachish water.

The fluctuations of constructing crustacean populations (C. insidiosum, T. cavolinii, E. brusiliensis and Microdentopus gryllotalpa) were studied in the north of the brackish lake Biguglia with monthly calculations of density. This density was estimated during the year 1968/69, which was characterized by exceptional winter rains bringing large quantities of fresh water and lowering the salimity from 34-1.7%. Ninety-five to nearly 100% of the indicated populations disappeared with the current. Experiments on the tolerance of salinity of T. cavolinii and C. insidiosum show that the 2 spp. are fairly euryhaline.--Copyright 1974, Biological Abstracts, Inc.
W75-04490

NITROGEN FIXATION (ACETYLENE REDUCTION) BY PHYTOPLANKTON IN GREEN BAY, LAKE MICHIGAN, IN RELATION TO NUTRIENT CONCENTRATIONS,
Illinois Univ., Urbana. Dept. of Botany.
For primary bibliographic entry see Field 5C.
W75-04498

A NEW TECHNIQUE FOR THE STUDY OF EPIPHYTIC ALGAE,
Clayton Junior Coll., Morrow, Ga.
For primary bibliographic entry see Field 5C.
W75-04499

SALSVATN, A LAKE WITH OLD SEA WATER,
Oslo Univ. (Norway). Dept. of Limnology.
A. Boyum.
Schweiz Z Hydrol, Vol 35, No 2, p 262-277, 1973, Illus.
Identifiers: Lakes, *Norway(Salsvatn Lake), Salinity, *Sea water, Lake sediments.

Salsvatn is a 464 m deep lake laying 16 m above sea level in North Tronfelag, Norway. The lake was isolated from the sea some 3000 yr ago. It is assumed that salt-water in the deepest 50 m of the lake is the remainder of sea water trapped in the lake at this time. The concentration of chloride in the salt-water layer corresponds to a salinity of 29‰ as in ordinary sea water. The hydrography of the lake and changes in some components of the salt water compared with ordinary seawater are discussed. A comparison is made with changes in the stagnant layers of the Black Sea and Lake Rorholtfjorden. The latter is another lake with old sea water at its bottom. Surface sediment samples were collected from the freshwater and salt-water layers in Lake Rorholtfjorden and from the salt-water layer of Lake Salsvatn. Some chemical components of the sediments and interstitial water were analyzed.--Copyright 1974, Biological Abstracts, Inc.
W75-04500

REGULATION OF GREAT LAKES WATER LEVELS--APPENDIX E--COMMERCIAL NAVIGATION.
International Joint Commission-United States and Canada. Great Lakes Levels Board.
December, 1973. 162 p, 20 fig, 69 tab.

Descriptors: *Great Lakes, *Water level fluctuations, *Economic impact, Evaluation, *International Joint Commission, Great Lakes Region, Lakes, Water levels, *Regulation, Water management(Applied), Comprehensive planning, Planning, Water policy, Transportation, Water resources development, Cost-benefit analysis, Governmental interrelations, United States, Canada, Economics, Foreign trade, Economic prediction, Navigation.
Identifiers: Environmental policy, International agreements, Coastal zone management.

Analyzed are the effects of lake level fluctuations upon commercial navigation interests within the Great Lakes-St. Lawrence River System. The appendix details the methodology applied in the assessment of the potential benefit or loss to shipping and the evaluation of economic effects upon navigation of regime changes that would occur under selected regulation plans. A computer program was prepared to integrate such factors as vessel characteristics, fleet size and composition, prospective commerce, and operating costs. All costs and benefits are based on 1971 price levels and an interest rate of seven percent. Transportation costs were determined for the four bulk commodities of iron ore, coal, limestone and grain which comprise nearly eighty-five percent of all Great Lakes traffic. Evaluations were made for the year 1970, using actual data, and for the years 1995 and 2020, using estimates of future traffic and vessel fleet composition and characteristics. Evaluation of commodities comprising the remaining fifteen percent was deemed to have no significant effect upon the results obtained using the four major bulk commodities. (See also W75-03682) (Deckert-Florida)
W75-04601

SEDIMENT TRAP EFFICIENCY OF SMALL RESERVOIRS,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
For primary bibliographic entry see Field 2J.
W75-04702

TEMPERATURE DYNAMICS IN DIMICTIC LAKES,
Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
H. Stefan, and D. E. Ford.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY1, Proceedings paper 11058, p 97-114, January 1975. 11 fig, 25 ref, 2 append.

Descriptors: *Limnology, *Lakes, *Reservoirs, Hydrodynamics, Temperate, *Energy budget, Heat budget, Thermal properties, Turnovers, Heating, Heat transfer, Conduction, Convection, Radiation, Thermocline, Stratification, Environmental engineering, Hydraulics, Winds, Weather, *Water temperature, *Forecasting.
Identifiers: *Dimictic lakes.

Daily water temperature profiles in temperate or dimictic lakes (defined as those lakes whose surface temperature is above 4C in summer and below 4C in winter) were predicted from time-variable meteorological conditions and lake morphology. A total energy concept was used. The method of analysis was derived and illustrated through case studies. Agreement of predicted and measured water temperatures in two lakes throughout the summer season was good. Although energy inputs and losses were computed separately, the method of analysis recognized and incorporated the mutual interdependence between different forms of energy input. (Jess-ISWS)
W75-04705

2I. Water In Plants

THE INFLUENCE OF SOIL WATER POTENTIAL ON THE PERENNIAL VEGETATION OF A DESERT ARROYO,
New Mexico State Univ., University Park. Dept. of Biology.
F. R. Balding, and G. L. Cunningham.
The Southwestern Naturalist, Vol 19, No 3, p 241-248, September 23, 1974. 1 fig, 2 tab, 4 refs.

Descriptors: *Arroyos, *Soil water, Soil moisture, Regression analysis, Arid climates, Semiarid climates, Soil chemical properties, Soil physical properties, Shrubs, Plant groupings, Vegetation, Ephemeral streams, Drainage, Precipitation(Atmospheric), Soil-water-plant relationships, *Desert plants.
Identifiers: Soil water potential gradient.

Soil water potential is an important environmental factor limiting the numbers and sizes of perennial plant species in arid and semi-arid regions. The density, mean plant height, and mean plant width of the perennial shrubs in a small desert arroyo were compared with the soil water potential gradient along the arroyo during one growing season. The density of shrubs was negatively correlated with the soil water poteneital gradient, while shrub mean size was positively correlated with the gradient. The soil water potential alone can not account for the variation in vegetation parameters; additional factors such as soil chemical and physical properties, and interactions between the species present also contribute to the variations. (Mastic-Arizona)
W75-04365

SPY MESA YIELDS BETTER UNDERSTANDING OF PINYON-JUNIPER IN RANGE ECOSYSTEM,
Soil Conservation Service, Phoenix, Ariz.; and Bureau of Land Management, Phoenix, Ariz.
A. P. Thatcher, and V. L. Hart.
Journal of Range Management, Vol 27, No 5, p 354-357, September 1974. 1 tab, 7 fig, 11 ref.

Descriptors: Ecosystems, Soils, Soil types, Pinyon pine trees, Juniper trees, Shrubs, Grasses, Infiltration, Runoff, Soil-water-plant relationships, Soil surfaces.
Identifiers: Spy Mesa, Arizona, Plant succession.

The natural occurrence of pinyon-juniper in range ecosystems was studied in Spy Mesa relict area of the Arizona Strip in northern Arizona. The area has a wide variety of soils, and natural fires have occurred over the past 50 years. Following natural fires, grasses became significant only on soils with sandy surface textures. Pinyon-juniper was the dominant species in the absence of fire regardless of the soil type. No significant amounts of grass were produced at any platy surface layer. Soils with this characteristic have poor water infiltration rates and high runoff rates eliminating those plants that are unable to compete for limited moisture. Pinyon, juniper, and shrubs are the principal plants produced on these soils. Soils having granular sandy loam surface layers, even when very shallow, produced large quantities of grass under natural conditions. (Mastic-Arizona)
W75-04375

RESPONSE OF HERBACEOUS VEGETATION TO FELLING OF ALLIGATOR JUNIPER,
Forest Service (USDA), Flagstaff, Ariz. Rocky Mountain Forest and Range Experiment Station.
W. P. Clary.
Journal of Range Management, Vol 27, No 5, p 387-389, September 1974. 1 tab, 2 fig, 12 ref.

Descriptors: *Juniper trees, *Forage grasses, *Range management, *Plant growth regulators, *Arizona, Runoff, Soil-water-plant relationships, Sediments, Ranges, Small watersheds, Vegetation, Forage production.
Identifiers: Tree felling.

A 13 percent crown cover of alligator juniper was removed from a 100 acre experimental watershed in north-central Arizona resulting in a 38 percent increase in total herbage production and a 45 percent increase in forage plant production. Felling with power saws was used to eliminate soil pits areated by uprooting through cabling or pushing. These pits are considered undesirable because they reduce runoff by retaining surface water, are a potential source of sediment, and much of the cool season grasses are destroyed which normally grow beneath the tree crowns. Herbage increases were highly variable with little or no response in 3 of the 7 post-treatment years. Indications are that average herbage production may reach a near steady state within several years after tree removal. Little effect of the treatment on ground cover and range condition was detected suggesting that major changes will either take long periods of time or require major changes on grazing management. (Mastic-Arizona)
W75-04376

INFILTRATION FOR THREE RANGELAND SOIL-VEGETATION COMPLEXES,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center; and Soil Conservation Service, Phoenix, Ariz.
For primary bibliographic entry see Field 2G.
W75-04377

RANGE PLANT YIELD AND SPECIES RELATIONSHIPS IN NATURAL AND PARTIALLY CONTROLLED ENVIRONMENTS,
Agricultural Research Service, Logan, Utah.
A. T. Bleak, W. Keller, and A. C. Hull, Jr.
Journal of Range Management, Vol 27, No 5, p 396-399, September, 1974. 4 tab, 3 fig, 4 ref.

Descriptors: *Soil moisture, *Crop production, *Arid lands, *Soil-water-plant relationships, *Forage grasses, Precipitation(Atmospheric), Root systems, Harvesting, Alfalfa, Utah, Soil moisture meters.
Identifiers: Crested wheatgrass, Russian wildrye, Cheatgrass, Kochia.

The effect of stand improvement or depletion with age, the production by single species and species mixtures, and soil moisture depletion within isolated plants were studied using alfalfa, cheatgrass, Kochia, crested wheatgrass, and Russian wildrye. Plots were isolated from the surrounding soil by heavy plastic sheeting to a depth of 1.4 m. Some plots received only natural precipitation some 1 - 1/2 times the growing season precipitation, some 2/3 of the normal precipitation. These different moisture levels had no significant effect on herbage yields over a 3 year period. Alfalfa plots were the most productive. Alfalfa and Kochia were found to have put roots beneath the plastic barrier into the adjacent soil. Alfalfa was least affected and Kochia most affected by a close (5 cm.) harvest height. (Mastic-Arizona)
W75-04378

WATER UPTAKE BY SEEDS AS AFFECTED BY WATER STRESS, CAPILLARY CONDUCTIVITY, AND SEED-SOIL WATER CONTACT. I. EXPERIMENTAL STUDY AND, II. ANALYSIS OF EXPERIMENTAL DATA,
Volcani Inst. of Agricultural Research, Bet-Dagan (Israel). Dept. of Soil Physics.
A. Hadas, and D. Russo.
Agronomy Journal, Vol 66, No 5, p 643-652, September-October 1974. 11 fig, 2 tab, 21 ref, 2 parts.

Descriptors: *Hydraulic conductivity, *Soils, *Germination, *Arid lands, Seeds, Seed treatment, Soil water, Soil texture, Stress, Soil aggregates.
Identifiers: Seed-soil water contact area, Chickenpea, Pea, Vetch.

Inhibition and seed germination as affected by water potentials, hydraulic conductivity, and seed-water area contact were studied. Chickenpea, pea, and vetch seeds were germinated in pure, aerated water and in sand or aggregate fractions of various grain-sized classes. Results show that low values of external water potential affect the rate of water uptake, but not percent of germination as long as waterpotential is higher than a critical value that is a species-specific. For a given seed-water contact area, any decrease in hydraulic conductivity reduced rates of water uptake and germination; total germination was not affected as long as the critical water potential was not reached. The data also shows that for optimal seed-soil water contact in aggregated soils, the mean aggregate size should be one-fifth to one-tenth of the seed's diameter. Possible applications to field practices, such as seed-bed preparation, are discussed. (Mastic-Arizona)
W75-04381

ENERGY BUDGET MEASUREMENTS OVER THREE COVER TYPES IN EASTERN ARIZONA,
Forest Service (USDA), Tempe, Ariz. Forest Hydrology Lab.
J. R. Thompson.
Water Resources Research, Vol 10, No 5, p 1045-1048, October 1974. 4 fig, 2 tab, 12 ref.

Descriptors: *Energy budget, *Evapotranspiration, *Small watersheds, *Vegetation effects, *On-site data collections, Radiation, Seasonal, Plant growth, Pine trees, Clear-cutting, Precipitation(Atmospheric), Slopes, Soil temperature, Runoff, Rain gages, Streamflow, Arizona, Climatic data, Solar radiation, Dew point, Vapor pressure.

Measurements of net radiation and evapotranspiration were made over a 3-year period for a pine forest, a cienega, and a clear-cut opening in the Apache National Forest of eastern Arizona. Seasonal patterns for net radiation and evapotranspiration were determined using the energy budget measurements in the Bowen ratio equation. Evapotranspiration for the growing season was 19.4 inches for the forest, 15.3 inches for the clear-cut, and 13.2 inches for the cienega. Weighting these amounts by the extent of the cover type resulted in an average evapotranspiration amount of 18.4 inches for the growing season. Some inconsistent results were obtained when data were used from days when reverse vapor pressure gradients existed. The ratios appeared reasonable when only data from days with continuous vapor movement away from the surface were used. With all data combined, the ratios lost some of the seasonal pattern. (Mastic-Arizona)
W75-04383

PHENOLOGICAL EVENTS AND THEIR ENVIRONMENTAL TRIGGERS IN MOJAVE DESERT ECOSYSTEMS,
California Univ., Los Angeles. Lab of Nuclear Medicine and Radiation Biology.
J. C. Beatley.
Ecology, Vol 55, No 4, p 856-863, Autumn 1974. 1 fig, 20 ref.

Descriptors: *Phenology, *Ecosystems, *Rainfall, *Desert plants, *Arid climates, Plant populations, Rodents, Soil Moisture, Temperature, Animal populations.
Identifiers: *Mojave Desert.

The occurrence of phenological events in the Mojave Desert ecosystem are dependent on heavy rains (> 25 mm (1 in)). The most predictable of these are the regional rains between late September and early December. Rains during this period are necessary for successful vegetative and reproductive growth of most shrubs, perennials, and annuals in the following winter and spring. Summer rains appeared to have little immediate

significance for most native plant and animal populations except under certain conditions when rainfall may trigger growth and reproduction of primary producers permitting at least moderate or local success every season. Whether seasonal success is to be regional or local is not predictable except as the season progresses and the pattern of expression of the controls unfolds during the autumn and winter months. (Mastic-Arizona)
W75-04385

ECONOMICS OF FERTILIZER APPLICATION ON RANGE AND MEADOW SITES IN UTAH,
Utah State Univ., Logan. Dept. of Range Science.
J. P. Workman, and T. M. Quigley.
Journal of Range Management, Vol 27, No 5, p 390-393, September 1974. 1 fig, 4 tab, 12 ref.

Descriptors: *Forage grasses, *Range management, *Fertilizers, *Economics, *Utah, Ranges, Marginal return, Nitrogen, Phosphorus, Nitrates, Harvesting, Hay, Profit, Grazing, Precipitation(Atmospheric), Grasslands.

Forage production responses to applications of nitrogen and phosphorous on five Utah range and meadow sites and one Idaho range were subjected to economic analysis. None of the sites studied responded to phosphorus application, but forage production on three sites increased significantly with nitrogen applications in the form of ammonium nitrate. Standard marginal economic analysis indicated that when the forage was harvested for hay, nitrogen application was profitable on the semi-wet meadow and mountain loam sites. Fall application offered a definite advantage over spring application on both sites. Nitrogen application proved unprofitable when increased production was valued in terms of range forage. (Mastic-Arizona)
W75-04388

FASCICLE DENSITY AND NEEDLE GROWTH RESPONSES OF RED PINE TO WATER SUPPLY OVER TWO SEASONS,
Forest Service (USDA), Durham, N.H. Northeastern Forest Experiment Station.
P. Garrett, and R. Zahner.
Ecology. Vol 54, No 6, p 1328-1334. 1973, Illus.
Identifiers: *Fascicle density(Pines), Growth rates, Mitosis, *Needle growth(Pines), *Pine trees(Red), Pinus-Resinosa, Seasonal, Water supply.

The ontogeny of terminal growth in red pine (Pinus resinosa Ait.) suggests that the growing season in Michigan be divided into three 2-mo. periods: April-May, June-July, and Aug.-Sept. It is during the middle period that mitotic activity at the shoot apex initiates dwarf shoot primordia in the bud for the subsequent season's foliage; thus, preconditioning 1 yr has a strong effect on next year's growth. Water was applied to or withheld from the soil under 23-yr-old trees in various combinations of the 2-mo. periods over 2 growing seasons. All effects of drought were greatest on the terminal shoot of the main stem, diminishing on terminals of branches with distance from the apex, and disappearing at the base of the crown. Shoot extension was governed equally by conditions of the middle period of the previous year and of the early period of the current year. Each year fascicle density was regulated only by water conditions of the early period of the current year, regardless of preconditioning. Spacing of needles on shoots depended on elongation of the stem internodes between dwarf shoots, and was independent of the number of fascicles. Number of fascicles per shoot was governed only by conditions of June-July of the previous year, with drought during this period reducing the number of 30%. Length of needles was related to two factors: the number of fascicles produced per shoot and the water treatment of the period during which needles elongated. Thus when the water supply of the middle of the previous year was deficient, fewer but longer needles were produced currently; when water during the middle of the current year was deficient, needles were reduced in length by about 30%. It is concluded that the interaction of 2 seasons' water supply are usually compansative, rarely additive. The average net effect on foliage production is a long-term, year-to-year stabiility in photosynthetic potential for red pine.--Copyright 1974, Biological Abstracts, Inc.
W75-04424

DOMINANCE OF CALIFORNIA ANNUAL GRASSLANDS BY BRASSICA NIGRA,
Illinois Univ., Urbana. Dept. of Forestry.
D. T. Bell, and C. H. Muller.
Am Midl Nat. Vol 90, No 2, p 277-299. 1973 Illus.
Identifiers: Allelopathic mechanism, Animal boraging, Annual, Avena-Fatua, *Brassica-Nigra, Bromus-Mollis, Bromus-Rigidus, Browsing, *California, *Grasslands, Leachate, Pasture.

B. nigra (L.) Koch is a dicotyledonous member of the annual grassland vegetation of southern California. Pasture grassland areas often show pure stands of this species surrounded by areas inhabited by various mixtures of the grassland associates. Yearly regeneration of these pure stands occurs at the 1st rainfall of late autumn and initiates the growing season of all annual species of this vegetative type. At this time the weedy grass species which characterize these annual grasslands are notably absent in the areas of Brassica dominance. The exclusion of the grasses, such as Avena fatua, Bromus rigidus and Bromus mollis occurs primarily as a result of an allelopathic mechanism, involving the leaching of water soluble toxins from standing dead stalks and dead leaf material remaining in the soil. The pattern of geographic isolation of the species was shown not to be a result of spatial differences in soil texture, pH or temperature. Competitive mechanisms involving light or soil factors failed to be effective in this case of interference. Animal foraging was shown to be of minimal consequence. A potentially highly allelopathic, volatile toxin from living vegetative parts of Brassica was shown to lack an ecologically effective mechanism. Exudates from germinating seeds exhibited no effect upon grass seed in the laboratory and the possibility that this mechanism could be operative under field conditions is negligible. Water soluble phytotoxins, however, provide an ecologically effective mechanism which is operative in this field-inhibition phenomenon. Water soluble toxins inhibit the annual grassland species and permit the invasion and control of extensive grassland areas by B. nigra.--Copyright 1974, Biological Abstracts, Inc.
W75-04435

SOME EFFECTS OF SPRING SNOWMELT RUNOFF ON AQUATIC INVERTEBRATE POPULATIONS IN A HIGH MOUTAIN STREAM,
Wyoming Univ., Laramie. Water Resources Research Inst.
W. R. Good.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 239 405, $5.25 paper copy, $2.25 microfiche. Completion Report, Water Resources Series No 50, April 1974. 103 p, 20 fig, 8 tab, 25 ref, 7 append. OWRT A-006-WYO (1).

Descriptors: *Snowmelt, *Wyoming, *Invertebrates, *Benthos, Runoff, Water temperature, Streams , *Diptera, Reproduction, *Breeding, *Hatching.
Identifiers: Nash Fork Creek(Wyo).

This study investigates the abiotic and biotic factors acting on a community of benthic invertebrates in a high mountain stream during the spring snowmelt runoff period. Data used were collected in 1970. The study area was a 1 km section of Nash Fork Creek near 3,000 m in the Snowy Range, Wyoming. Runoff began in mid-May when the discharge was 6 c.f.s., rose erratically to a peak on June 25, at 125 c.f.s., then dropped through the rest of the summer. Water temperatures increased through the runoff from 0C. in mid-May to 4.5-11.5C. on June 25 and 7-16C. by July 21. The general snow cover over the stream present in mid-May was gone by June 4. For each invertebrate species in the study area which could be separated, population estimates were made, size ranges were recorded, and when possible, hatching and breeding periods were noted. Adjustment of the life cycle was a common means of adaptation to the runoff and was manifested in several ways: (1) The Diptera avoided exposing pupae to the peak of the runoff; (2) Many insect species were found to breed during the runoff; (3) Prolonged hatching of eggs or avoidance of hatching, were recongized as runoff-survival strategies.
W75-04450

VERTICAL DISTRIBUTION OF FRESHWATER MUSSELS (PELECYPODA, UNIONIDAE) IN SOUTHWESTERN FINLAND,
Turku Univ. (Finland). Dept. of Zoology.
E. Haukioja, and T. Hakala.
Ann Zool Fenn Vol 11, No 2, p 127-130, 1974. Illus.
Identifiers: Anodonta-piscinalis, Clays, *Distribution patterns, *Finland, Lakes, *Mussels(Freshwater), Pelecypoda, Pseudanodonta-complanata, Rivers, Silt, Unio-pictorum, Unio-tumidus, Unionidae, Vertical distribution.

Species composition, numbers and biomass in relation to depth are presented for a lake and a river in southwestern Finland. Species found were Unio tumidus, U. pictorum, Anodonta piscinalis and Pseudanodonta complanata. U. pictorum was most strictly limited to shallow waters and P. complanata to deeper waters. A piscinalis evidently had the widest tolerance of depth. Highest densities and biomass (up to 11.8 kg/m2) were found in 0-1 m depth. From this depth downwards densities decreased sharply and few individuals were found at 5 m. In all species the smaller individuals tended to live in shallower waters. The nature of the bottom was also important; all mussels avoided hard clay and very soft silt.--Copyright 1974, Biological Abstracts, Inc.
W75-04486

DISTRIBUTION AND ECOLOGY OF AMPHIPODES (ESPECIALLY GAMMARIDES) IN THE BASIN AND ESTUARY OF THE DOURDUFF RIVER (BRITTANY, FRANCE), (IN FRENCH),
Amsterdam Univ. (Netherlands). Inst. of Taxonomic Zoology.
Marion J. Van Maren.
Bull Zool Mus Univ Amst Vol 3, No 22, p 189-209, 1974. Illus.
Identifiers: *Amphipods, Competition, *Distribution patterns, Echinogammarus-berilloni, *Ecology, Estuary, *France(Dourduff River), Gammarids, Gammarus-chevreuxi, Gammarus-zaddachi, Reproduction, River basins, Salinity, Seasonal.

Stations (1-5) situated at the head of the Dourduff-estuary (Brittany, France), were sampled monthly at springtide during the period of May-Oct. 1971. The data obtained this way show a shifting in the populations of Echinogammarus berilloni, Gammarus chevreuxi and G. zaddachi from the upstream part of the estuary downstream and vice versa. E. berilloni can exist in the head of the estuary as long as G. chevreuxi and G. zaddachi are few in number or absent (i.e., May-Sept.). When in Sept. the latter 2 spp. repopulate the upstream part of the estuary, E. berilloni disappears from this river section and is found only farther upstream. Because it has been domonstrated that E. berilloni can sustain salinities up to 80% seawater (Vincent, 1966), the increased salinity in the head of the estuary, during the springtides in au-

tumn, can not explain the disappearance of this species in that part of the river. The reproduction period of E. berilloni falls during May and June. Several places in the estuary, samples were taken in the main stream and in the brooklets discharging into it. This sampling resulted in a survey of the distribution of gammarids in the estuary in correlation with some environmental factors. A microgeographical analysis was executed in the non-estuarine part of the Dourduff and its ramifications. The distribution of species in this part of the river system is shown.--Copyright 1974, Biological Abstracts, Inc.
W75-04488

INFLUENCE OF FRESHWATER DULUTION ON DYNAMICS OF POPULATIONS OF BUILDER CRUSTACEANS FROM LAGOON OF BIGUGLIA, CORSICA (COROPHIUM INSIDIOSUM C., TANAIS CAVOLINII M.E., ERICHTHONIUS BRASILIENSIS D.), (IN FRENCH),
Centre d'Oceanographie, Marseille (France). Station Marine d'Endoume.
For primary bibliographic entry see Field 2H.
W75-04490

THE OCCURRENCE OF YOUNG SARDINELLA AURITA IN THE BRACKISH WATER OF THE LAGOONS OF CANANEIA (BRAZIL), (IN GERMAN),
Sao Paulo Univ. (Brazil). Instituto Oceanografico.
For primary bibliographic entry see Field 2L.
W75-04492

NOTE ON GROWTH OF THE BREAM, ABRAMIS BRAMA (LINNAEUS, 1758) IN THE ORLIK VALLEY WATER RESERVOIR,
Karlova Universita, Prague (Czechoslovakia). Lab. of Ichthylogy.
A. S. Naiksatam.
Vestn Cesk Spol Zool, Vol 38, No 2, p 113-116, 1974, Illus.
Identifiers: Abramis-brama, *Bream, *Czechoslovakia(Orlik Valley reservoir), *Growth rates, Reservoirs, Scales, Age.

Age and growth was studied by using scales of 121 specimens of A. brama from the Orlik valley water reservoir of Czechoslovakia. Computation of growth history was made by using Lee's method. The growth of bream from the Orlik valley water reservoir compared with some selected data published from various localities of Czechoslovakia, show a relatively slow rate of growth compared with the growth in other valley water reservoirs. In comparison with the data summarized by Oliva and by Poupe the rate of growth is average.--Copyright 1974, Biological Abstracts, Inc.
W75-04493

REMARKS ON BIONOMY OF FAMILY CYPRINODONTIDAE (PISCES) WITH RESPECT TO DEPENDENCY OF DEVELOPMENT OF EMBRYOS OF ROLOFFIA FOLOFFI (AHL., 1938) ON THE HARDNESS OF THE WATER, (IN GERMAN),
S. Frank.
Vestn Cesk Spol Zool, Vol 38, No 1, p 13-18, 1974, Illus.
Identifiers: *Bionomy, *Cyprinodontidae, *Embryo development, Extracts, Peat, Pisces, *Roloffia-roloffi, *Water hardness.

The jungle waters of southern Sierra Leone in western Africa are the habitat of R. roloffi, which is easily kept in aquariums. The optimal water hardness range for the development of eggs and larvae is approximately 14-16 degrees dNKH (a measurement of noncarbonate or sulfate content), in which case mortality reaches a maximum of 5%. When water hardness is reduced to 10 degrees or increased to 20 degrees, mortality increases significantly. When carbonate content exceeds 1 degree, the net negative effect is even more drastic. Peat extracts almost double the embryonic development time at a constant water temperature of 26C, increasing it from 10-12 days to 18-22 days; mortality also increases.--Copyright 1974, Biological Abstracts, Inc.
W75-04494

EFFECT OF LEAF AREA REDUCTION ON THE WATER REQUIREMENT OF BARLEY (HORDEUM VULGARE L.),
Arizona Univ., Tucson.
A. L. Foutz, A. K. Dobrenz, and M. A. Massengale.
Journal of the Arizona Academy of Science, Vol 9, No 2, June 1974. p 51-54, 3 fig, 1 tab, 17 ref.

Descriptors: *Transpiration, *Transpiration control, *Water requirements, *Barley, *Crop yield, *Defoliation, Plant growth, Leaves, Crop production, Photosynthesis.
Identifiers: *Defoliation, Leaf area reduction.

Since transpiration accounts for a large percentage of water used by a crop, efficiency could be increased by decreasing transpiration. In this experiment, leaf blades were clipped when the flag leaf emerged from the sheath. Leaf area reduction treatments consisted of (a) removal of all the leaves except the flag leaf (b) removal of all leaves except the flag and two adjacent leaves, and (c) the removal of all leaves except the flag and one adjacent leaf, and (d) no leaf removal. Transpiration rates were decreased with increased leaf area reduction. Yields of the defoliated plants were also significantly reduced with increased leaf area reduction. Leaf removal may be an effective water use reduction technique in producing a barley crop. Timing of defoliation treatments is critical to prevent severe reductions in yields, and should be made when the flag leaf is fully emerged. (Mastic-Arizona)
W75-04511

MODEL FOR PREDICTING PLANT YIELD AS INFLUENCED BY WATER USE,
Utah State Univ., Logan.
R. J. Hanks.
Agronomy Journal, Vol 66, No 5, p 660-665, September-October, 1974. 4 tab, 6 fig, 22 ref.

Descriptors: *Plant growth, *Water utilization, *Model studies, *Crop production, *Soil-water-plant relationships, Soil water, Transpiration, Evaporation, Irrigation, Drainage, Field capacity, Wilting, Moisture uptake, Evapotranspiration, Rainfall, Agriculture.

A model is presented for predicting plant yield in both total dry matter and grain, as a function of water use. It was assumed that transpiration is the only water-use factor directly influencing plant growth. Evaporation and drainage have an indirect influence on the amount of water available for transpiration. The yield-water use curve was found to be sensitive to transpiration and evaporation assumptions. The model is simple and inexpensive to run on a computer, and can be used to predict seasonal yields based on factors such as irrigation frequency and amount of rainfall and soil water storage. (Mastic-Arizona)
W75-04609

SOME EFFECTS OF SUBIRRIGATION ON BENTGRASS DURING HEAT STRESS IN THE FIELD,
Arizona Univ., Tucson. Dept. of Soils, Water, and Engineering.
J. V. Krans, and G. V. Johnson.
Agronomy Journal, Vol 66, No 4, p 526-530. July-August, 1974. 3 tab, 5 fig, 10 ref.

Descriptors: *Irrigation effects, *Turf grasses, *Root development, *Root distribution, *Crop production, Sprinkler irrigation, Heat, Temperature, Stress, Aeration, Wilting, Chlorphyll, Fertilization, Water table, Soil gases.
Identifiers: *Subirrigation, Bentgrass, N chlorosis.

The alleviation of the adverse effects of heat stress by subirrigation of bentgrass was studied. Results of prolonged temperature stress include dissication, disease, or insect damage. Effects were evaluated in a field study from clipping yields, chlorphyll content, and root distribution. Root development was significantly improved by subirrigation. Wilting was not experienced by plants under this treatment, while surface irrigated treatments required periodic syringing to alleviate this problem. A major problem of the subirrigated treatment was N chlorosis related to a high temperature and poorly aerated environment. Proper adjustment of water table levels and surface fertilization should improve aeration and eliminate N chlorosis increasing turf quality. (Mastic-Arizona)
W75-04612

EFFECT OF ROOT PRUNING ON WATER RELATIONS AND GROWTH OF COTTON,
Southern Regional Research Lab., New Orleans, La.; and Alabama Agricultural Experiment Station, Auburn.
J. R. Stansell, B. Klepper, and V. D. Browning.
Agronomy Journal, Vol 66, No 4, p 591-592. July-August, 1974. 3 fig, 1 tab, 10 ref.

Descriptors: *Root development, *Root distribution, *Plant growth, *Root systems, *Soil-water-plant-relationships, Moisture uptake, Soilwater, Growth rates, Moisture content, Cotton, Moisture stress.
Identifiers: Root pruning.

An experiment was conducted to determine the effects of root-system loss on plant water use and growth rates. Approximately one-fourth of the root length was severed by forcing a sharp-edged plate horizontally through the soil in a study compartment. Growth parameters such as stem diameters and plant height were measured daily along with water uptake by the cotton plants. Growth reductions were greater after root pruning when the root systems were small and concentrated in the upper 25 cm. of soil. Growth was less affected in plants with deeper and more extensive root systems. Although the proportion of roots removed was approximately the same, greater growth reduction occured in the more concentrated root systems indicated that the effect of root pruning, especially after soil water content had decreased, depends on distribution of the remaining root system rather than the percentage of roots removed. (Mastic-Arizona)
W75-04613

RELATIVE INFLUENCE OF MOISTURE-AERATION AND NUTRIENTS ON VEGETATION AND BLACK SPRUCE GROWTH IN NORTHERN ONTARIO,
Great Lakes Forestry Research Center, Sault Sainte Marie (Ontario).
J. K. Jeglum.
Can J For Res, Vol 14, No 1, p 114-126, 1974.
Identifiers: *Aeration, *Black spruce, *Canada(Ontario), *Growth rates, *Moisture, *Nutrients, Peatlands, Picea-Mariana, Sites, Spruce, Vegetation.

Results from a principal component analysis suggest that nutrient regime is more important to vegetational variation than the moisture-aeration regime. Correlations between site index and habitat measures suggest that the moisture-aeration regime influences tree growth more than the nutrient regime. For particular components of vegetational variation and for segments of the total data the proportional influence of the 2 gradients varies. Moisture-aeration and nutrient regimes explain a large proportion of the variation in minor vegetation and tree growth on black spruce (Picea

mariana) peatlands (Canada).--Copyright 1974, Biological Abstracts, Inc.
W75-04837

2J. Erosion and Sedimentation

PARTICULATE MATTER AT THE SEDIMENT-WATER INTERFACE IN COASTAL ENVIRONMENTS,
Chicago Univ., Ill. Dept. of the Geophysical Sciences.
For primary bibliographic entry see Field 2L.
W75-04497

SUSPENDED SOLIDS CARRIED BY THE GALLATIN RIVER OF SOUTHWESTERN MONTANA: AMOUNTS CARRIED DURING SPRING RUNOFF,
Montana State Univ., Bozeman. Dept. of Plant and Soil Science.
M. G. Klages, L. D. Logan, and Y. P. Hsieh.
Northwest Sci, Vol 47, No 4, p 203-212, 1973, Illus.
Identifiers: Clays, Erosion, Measurement, *Montana(Gallatin River), Rivers, *Runoff, Sediments, Silt, Snow, Spring, *Suspended solids, *Turbidity, Snowmelt.

Erosion resulting from spring snowmelt and resultant runoff is the major contributor to suspended solids in the Gallatin River. The suspended load varies with time, but one season can be compared to another if several samplings are averaged. Yearly variations in suspended load were not closely related to either total runoff or peak flow. Runoff from urban and agricultural lands contributes to sediment early in the season before snowmelt begins in the mountains. Streambank erosion is an important source of sediment in the broad lower valley during the high spring flow accompanying melting of the mountain snowpack. Geology is one of the important factors controlling suspended load in the steep, mountainous terrain of the upper part of the drainage. Soft, easily eroded, and unstable sedimentary rocks produce most of the suspended solids. Taylor Fork is one of the major contributors to sediment in the Gallatin River. Hard volcanic and metamorphic igneous rocks give rise to clearer streams in this watershed even though the harder rocks are accompanied by stronger relief. Turbidity measurements can be used to estimate suspended solids. They are more accurate on suspended silt and clay than on total suspended solids.--Copyright 1974, Biological Abstracts, Inc.
W75-04501

A GEOPHYSICAL AND GEOLOGICAL INVESTIGATION OF POTENTIALLY FAVORABLE AREAS FOR PETROLEUM EXPLORATION IN SOUTHEASTERN ARIZONA,
Arizona Univ., Tucson. Geophysics Lab.
C. L. V. Aiken, and J. S. Sumner.
Arizona Oil and Gas Conservation Commission, Phoenix, Report of Investigations 3. 1974, 40 p, 17 fig, 4 tab, 58 ref.

Descriptors: *Sedimentation, Geology, Exploration, Arizona, Fuels, Oil, Deposition(Sediments), Geophysics, Gravity studies, Cenozoic Era, Sedimentary petrology, Magnetic studies, Drill holes.

Surface geological investigations in the mountain ranges indicate that a thick sequence of marine sedimentary Paleozoic and Mesozoic (Cretaceous) rocks was deposited in the Pedregosa basin in southeastern Cochise County and adjacent shelf areas. The marine strata deposited in this basin are similar in many aspects to those in petroleum-productive areas in southeast New Mexico and west Texas. They contain organic-rich basin facies of rocks that were probable sources for oil and gas. Adverse factors such as the wide thickness variance of Cenozoic valley fill (100 feet or less to almost 12,000 feet) impede geologic investigations for petroleum. Data have been collected from gravity and magnetic and drill hole investigations. (Bahre-Arizona)
W75-04509

SEDIMENT TRAP EFFICIENCY OF SMALL RESERVOIRS,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
F. E. Dendy.
Transactions of the American Society of Agricultural Engineers, Vol 17, No 5, p 898-901, September-October 1974. 4 fig, 1 tab, 16 ref.

Descriptors: *Reservoirs, *Sediments, *Trap efficiency, Volume, Inflow, Watersheds(Basins), Suspended load, Efficiencies, Indexing, United States, *Lake sediments.

Despite widely varying reservoir sizes, shapes, sediment inflow rates, and volumes, trap efficiencies varied little among 17 small flood-water retarding reservoirs throughout the United States. Trap efficiencies ranged from 81 to 98% for periods of from 4 to 16 years. Trap efficiencies for dry reservoirs were essentially the same and varied over about the same range as ponded reservoirs. Relationships between trap efficiency and various parameters including capacity/watershed, capacity/inflow, calcium-sodium ratios, reservoir shapes, and sediment particle sizes were poorly defined and only explained a small portion of the total variation. Structures with a capacity/inflow ratio greater than 0.1 will trap 80 to 95% of inflowing sediments. Trap efficiencies of sediment particles larger than 0.062 mm range from 96 to 100%. The correlation coefficient between computed and observed trap efficiency values was 0.96. Thus, the prediction equation should provide reasonably good estimates, within 10 to 15%, of trap efficiency for most small reservoirs. (Dawes-ISWS)
W75-04702

RIVER REGIME WITH SPECIAL REFERENCE TO RIVER NILE,
Assiut Univ. (Egypt).
For primary bibliographic entry see Field 2E.
W75-04706

SOIL EROSION AND SEDIMENT TRANSPORT FROM GULLIES,
Agricultural Research Service, Columbia, Watershed Research Unit.
R. F. Piest, J. M. Bradford, and G. M. Wyatt.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY1, Proceedings paper 11069, p 65-80, January 1975. 7 fig, 4 tab, 19 ref, 1 append.

Descriptors: *Erosion, *Gullies, *Mass wasting, *Sedimentation, *Tractive forces, Soil mechanics, Sediment transport, Watersheds(Basins), Soil conservation, Watershed management, Storm runoff, Hydraulics, *Iowa.
Identifiers: *Treynor(Iowa), Loess soil mantle.

Field observations of four gullied watersheds, 74 acres to 150 acres in size, showed that gully erosion was one-fifth of the total sediment yield during a 9-yr period. Erosion rates were dependent upon mass wasting of loessial gully banks and headcuts. For the nonconservation watersheds, tractive forces exerted by runoff on the channel boundary did not detach appreciable amounts of undisturbed soil but were more than adequate to entrain the soil debris yielded by mass-wasting processes. Gully erosion was minimal on conservation watersheds; the runoff was generally below the levels required for gully debris removal, and the degree of slope was reduced to a stable value. Soil mechanics principles, applied to strength/stability aspects of gully banks in western Iowa, indicated that the height of the water table, soil cohesive strength, and rate of water infiltration are controlling factors. Initial field and laboratory model experiments provided insight into variables that affect the mass-wasting process. A large part of the gully soil debris accumulates during winter and early spring and is flushed from the channel with the first spring rainstorms. The relative quantities are greatly reduced for each subsequent runoff event during the year. (Singh-ISWS)
W75-04707

RAINDROP CHARACTERISTICS IN SOUTH CENTRAL UNITED STATES,
Agricultural Research Service, Baton Rouge, La.
For primary bibliographic entry see Field 2B.
W75-04713

2K. Chemical Processes

OVERSATURATION METHOD FOR PREPARING SATURATION EXTRACTS FOR SALINITY APPRAISAL,
Agricultural Research Service, Chickasha, Okla.
For primary bibliographic entry see Field 2G.
W75-04392

RADIOCARBON, CARBON-13 AND TRITIUM IN WATER SAMPLES FROM BASALTIC AQUIFERS AND CARBONATE AQUIFERS ON THE ISLAND OF OAHU, HAWAII,
Hawaii Inst. of Geophysics, Honolulu.
For primary bibliographic entry see Field 2F.
W75-04441

ELECTROCHEMICAL PROCESS FOR NUTRIENT REMOVAL,
Rhode Island Univ., Kingston. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5D.
W75-04446

DEPOSITION OF WATER AND CATIONS ON ARTIFICIAL FOLIAR COLLECTORS IN FIR KRUMMHOLZ OF NEW ENGLAND MOUNTAINS,
Cornell Univ., Ithaca, N.Y. Dept. of Ecology and Systematics.
W. H. Schlesinger, and W. A. Reiners.
Ecology, 55(2): 378-386, Illus, 1974.
Identifiers: Abies-balsamea, *Calcium, *Cations, *Fir krummholz, Foliar collectors, *Lead, *Magnesium, Mountains, New England, *Potassium, *Sodium, *New Hampshire.

Atmospheric depositions of water Ca, Mg, Na, K and Pb were measured in an Abies balsamea krummholz ecosystem in New Hampshire. Two types of collectors were used. Open buckets captured rainout, washout and sedimentation (bulk precipitation), while buckets with attached artificial conifer foliage collected intercepted aerosols and cloud droplets as well as bulk precipitation. Water catchment averaged 4.5 times greater in the foliar collectors than in open buckets, and Ca, Mg, Na, K and Pb deposition averaged 8.3, 6.0, 4.9, 5.7 and 5.5 times greater, respectively, in the foliar collectors. Most of the increase in foliar collectors was due to higher volume catchment, but some concentration enrichment through interception was also contributory. These data cannot be extrapolated to elemental deposition per unit area without correcting capture efficiency of collectors to that of natural vegetation. These data do strongly suggest, however, that in areas of high wind and frequent exposure to clouds or fog, such as in mountain areas of New England, measurements of total elemental deposition require an evaluation of interception as well as bulk precipitation.--Copyright 1974, Biological Abstracts, Inc.
W75-04471

CONTROLS ON THE QUALITY VARIATIONS OF SOME CARBONATE SPRING WATERS,
Goettingen Univ. (West Germany). Sediment-Petrographisches Institut.
For primary bibliographic entry see Field 2F.
W75-04710

THE COALESCENCE OF WATER DROPS,
Tel Aviv Univ. (Israel). Dept. of Environmental Sciences.
For primary bibliographic entry see Field 1A.
W75-04728

2L. Estuaries

THE EFFECT OF TEMPERATURE AND CHEMICAL POLLUTANTS ON THE BEHAVIOR OF SEVERAL ESTURINE ORGANISMS,
Ichthyological Associates, Inc., Middletown, Del.
For primary bibliographic entry see Field 5C.
W75-04353

ROOKERY BAY: ECOLOGICAL CONSTRAINTS ON COASTAL DEVELOPMENT,
Conservation Foundation, Washington, D.C.
For primary bibliographic entry see Field 5C.
W75-04354

DEVELOPMENT OF AN AIR POLLUTION MODEL FOR THE SAN FRANCISCO BAY AREA. THIRD SEMI ANNUAL REPORT TO THE NATIONAL SCIENCE FOUNDATION.
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 5A.
W75-04421

THE EFFECTS OF MERCURIC CHLORIDE UPON RESPIRATION IN CONGERIA LEUCOPHAETA,
Texas A and M Univ., College Station. Dept. of Biology.
For primary bibliographic entry see Field 5C.
W75-04472

FLUORIDE CONCENTRATIONS IN TWO PACIFIC COAST INLETS-AN INDICATION OF INDUSTRIAL CONTAMINATION,
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
For primary bibliographic entry see Field 5B.
W75-04473

PETROLEUM HYDROCARBONS IN NARRAGANSETT BAY: I. SURVEY OF HYDROCARBONS IN SEDIMENTS AND CLAMS (MERCENARIA MERCENARIA),
Woods Hole Oceanographic Institution, Mass. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W75-04477

PETROLEUM HYDROCARBONS IN NARRAGANSETT BAY: II. CHEMICAL AND ISOTOPIC ANALYSIS,
Woods Hole Oceanographic Institution, Mass. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W75-04478

PRODUCTION ECOLOGY OF TWO CARIBBEAN MARINE ECOSYSTEMS: I. PHYSICAL ENVIRONMENT AND FAUNA,
Liverpool Univ., Port Erin (England). Dept. of Marine Biology.
For primary bibliographic entry see Field 5C.
W75-04479

PRODUCTION ECOLOGY OF TWO CARIBBEAN MARINE ECOSYSTEMS: II. METABOLISM AND ENERGY FLOW,
Liverpool Univ., Port Erin (England). Dept. of Marine Biology.
For primary bibliographic entry see Field 5C.
W75-04480

ABUNDANCE, DIVERSITY AND SEASONAL PATTERNS OF ESTUARINE FISH POPULATIONS,
Environmental Protection Agency, Washington, D.C. Office of Technical Analysis.
For primary bibliographic entry see Field 5C.
W75-04485

LITTORAL FISH POPULATIONS AFTER AN OIL TANKER DISASTER IN THE FINNISH SW ARCHIPELAGO,
Turku Univ. (Finland). Archipelago Research Inst.
For primary bibliographic entry see Field 5C.
W75-04487

DISTRIBUTION AND ECOLOGY OF AMPHIPODES (ESPECIALLY GAMMARIDES) IN THE BASIN AND ESTUARY OF THE DOURDUFF RIVER (BRITTANY, FRANCE), (IN FRENCH),
Amsterdam Univ. (Netherlands). Inst. of Taxonomic Zoology.
For primary bibliographic entry see Field 2I.
W75-04488

THE OCCURRENCE OF YOUNG SARDINELLA AURITA IN THE BRACKISH WATER OF THE LAGOONS OF CANANEIA (BRAZIL), (IN GERMAN),
Sao Paulo Univ. (Brazil). Instituto Oceanografico.
V. Sadowsky.
Zool Anz, Vol 191, No 3/4, p 182-183, 1973.
Identifiers: *Brackish water, *Brazil(Lagoons of Cananeia), *Lagoons, Rain, *Sardinella-aurita, *Distribution patterns, Stenohaline fish.

Sardinella spp. are considered stenohaline fish whose distribution is confined to waters with a high salt content. However, young specimens of S. aurita have been seen for 20 yr in the lagoons of Cananeia, where they stay 8-10 mo. until they reach a length of 12-14 cm and have developed gonads, whereupon they return to the sea. Mass deaths of Sardinella occurred on the surface when tropical rains reduced the salt content of the water to 8% up to a depth of 5 m. When rains lower the salt content to the practical limit of 10-12%, the schools of fish leave the lagoons prematurely.--Copyright 1974, Biological Abstracts, Inc.
W75-04492

PARTICULATE MATTER AT THE SEDIMENT-WATER INTERFACE IN COASTAL ENVIRONMENTS,
Chicago Univ., Ill. Dept. of the Geophysical Sciences.
R. G. Johnson.
J Mar Res, Vol 32, No 2, p 313-330, 1974, Illus.
Identifiers: Aggregates, Coastal environment, Deposits, *Massachusetts, Minerals, Organic matter, Particulate matter, Quartz, Sediments, *Sediment-water interfaces.

A microscopic study was made of marine sediments to identify the kinds of materials present at the sediment-water interface and to describe these materials from a biological point of view. Fifty-two samples were collected at 26 stations in the vicinity of Woods Hole, Massachusetts. A total of 42 particle species was recognized. Up to 69% of the quartz particles were encrusted with organic matter. All of the samples contained flocculent organic-mineral aggregates in amounts varying from 13 to 71% particle abundance. Nearly all of the clay and silt size particles were incorporated in an organic matrix. The organic-mineral aggregates probably are the products of the recycling of organic matter by deposit feeders. An average of 61% of the particles examined in samples of surficial sediments were potential food particles. The standard methods of describing sediments are inadequate for understanding animal-sediment relations and geological processes. Encrusted particles and organic-mineral aggregates must have different sedimentological properties than clean or free mineral particles. Thus, while the bulk analysis of a sediment may reveal only a few percent organic matter, that may be one of its most important properties.--Copyright 1974, Biological Abstracts, Inc.
W75-04497

DISSOLVED AND PARTICULATE HUMIC ACID IN AN EAST COAST ESTUARY,
Adelphi Univ., Oakdale, N.Y. Inst. of Marine Science.
For primary bibliographic entry see Field 5B.
W75-04504

COMPARATIVE PHOTOSYNTHETIC CAPACITIES OF INTERTIDAL ALGAE UNDER EXPOSED AND SUBMERGED CONDITIONS,
Stanford Univ., Pacific Grove, Calif. Hopkins Marine Station.
For primary bibliographic entry see Field 5C.
W75-04524

AN OPERATIONAL FRAMEWORK FOR COASTAL ZONE MANAGEMENT PLANNING.
Meta Systems, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 6A.
W75-04558

ACID-IRON WASTE AS A FACTOR AFFECTING THE DISTRIBUTION AND ABUNDANCE OF ZOOPLANKTON IN THE NEW YORK BIGHT: II. SPATIAL VARIATIONS IN THE FIELD AND IMPLICATIONS FOR MONITORING STUDIES,
Harvard Univ., Cambridge, Mass. Biological Labs.
For primary bibliographic entry see Field 5B.
W75-04574

COASTAL RESOURCES MANAGEMENT AND CONSERVATION REPORT PUBLISHED,
Pollution Control Guide, Vol 3, paragraph 19733, p 19256-19260, 1974. 5 p.

Descriptors: *Coasts, *Legislation, *Federal government, Jurisdiction, Grants, Economics, Research and development, Conservation, Coastal plains, Coastal marshes, Governmental interrelations, Environmental effects, Comprehensive planning, Resources development, Water conservation, Water resources development.
Identifiers: *Coastal Zone Management Act, Coastal zone management.

The Coastal Zone Management Act provides federal support as an incentive to coastal states, to develop and implement coastal zone management programs within that state. The Act specifies that a state management program must define the boundaries of the coastal zone, list areas of particular state concern, propose a governmental structure to administer the program, and control land and water uses within the coastal zone. The legislation seeks cooperation among federal, state and local governments in dealing with land and water use decisions. Also provided is grant assistance to states for the acquisition, development, and operation of estuarine sanctuaries. Administrative regulations stipulating an allocation formula were made available so that the first grants can be issued by early 1974. Guidelines describing the federal approval process for proposed state management programs are being drafted. (Sperling-Florida)

W75-04583

ROTATING HYDRAULICS OF STRAIT AND SILL FLOWS,
Woods Hole Oceanographic Institution, Massachusetts.
J. A. Whitehead, A. Leetmaa, and R. A. Knox.
Geophysical Fluid Dynamics, Vol 6, No 2, p 101-125, 1974. 8 fig, 11 ref, append.

Descriptors: *Ocean currents, *Atlantic Ocean, *Straits, *Density stratification, *Rotational flow, Weirs, Model studies, Energy equation, Flow, Analytical techniques, Laboratory tests, Theoretical analysis.
Identifiers: *Straits of Gibralter, Cross channel balance, Strait flows, Sill flows.

An understanding of the elementary dynamical schemes of hydraulic rotating flows and laboratory testing were stressed for analyzing observed strait and sill flows. For example, there is tremendous interest in calculating transports and exchanges between the Atlantic Ocean and the Mediterranean Sea through the Straits of Gibraltar. The stratification effects were considered by examining a two-layer fluid. The upper layer is at rest and the lower layer flows from one large basin to another via a connecting channel. The flow was assumed to be principally in a down-channel direction. The flow down the channel or the strait was assumed straight or with little curvature of streamlines. The usual non rotating hydraulic principle of maximum transport in flow over a weir (the end of the channel) was applied and relations between transport, rotation rate, and upstream interface height were calculated. One of these relations was tested experimentally with favorable results. A nonsteady decaying flow in the same system was analyzed similarly and also compared well with experimental results, as did a flow in both layers driven by an initial density imbalance. Some connections with oceanic strait and sill flows were discussed. (Singh-ISWS)
W75-04716

CHEMICAL AND PHYSICAL CHARACTERIZATION OF TAR SAMPLES FROM THE MARINE ENVIRONMENT,
Shell Development Company, Houston, Tex. Bellaire Research Center.
For primary bibliographic entry see Field 5A.
W75-04718

AUTOMATION OF THE COLLECTION AND ANALYSIS OF SCIENTIFIC INFORMATION IN THE PROBLEM OF THE INTERACTION OF THE ATMOSPHERE AND OCEAN,
Linguistic Systems, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 2B.
W75-04729

THE PROBLEM OF ORGANIZATION OF A COASTAL COORDINATING COMPUTER CENTER,
For primary bibliographic entry see Field 7C.
W75-04732

A SYSTEM OF AUTOMATED PROCESSING OF DEEP WATER HYDROLOGICAL INFORMATION,
For primary bibliographic entry see Field 7C.
W75-04733

ERROR IN INTERPOLATION AND CHOICE OF THE RANGE OF DISCRETENESS IN MEASUREMENTS IN A HYDROPHYSICAL FIELD,
For primary bibliographic entry see Field 7A.
W75-04734

THE PROBLEM OF SELECTING AN OPTIMUM FREQUENCY FOR A MEASURING GENERATOR IN DETERMINING THE VALUE OF THE HYDROPHYSICAL PARAMETER WITH A GIVEN ACCURACY,
For primary bibliographic entry see Field 7B.
W75-04735

A SMALL-PARAMETER MODEL OF CIRCULATION IN AN HOMOGENEOUS BAROCLINIC OCEAN,
Ye. P. Borisenkov.
In: NASA TT F-801, p 121-144, November 1974. 6 ref.

Descriptors: *Mathematical models, *Ocean circulation, Oceanography, Meteorology, Hydrodynamics, Equations, Model studies.
Identifiers: Baroclinic ocean.

A small-parameter model of circulation in an homogeneous baroclinic ocean was presented. The principles common to the construction of small-parameter models and certain energetic principles developed in connection with atmospheric processes were used. These principles have already been applied in the study of processes in a baroclinic ocean. (See also W75-04729) (Sims-ISWS)
W75-04738

THE PROBLEM OF THE INFLUENCE OF OCEAN CURRENTS ON FREE INTERNAL GRAVITY WAVES,
V. G. Savchenko, and Z. R. Fuks.
In: NASA TT F-801, p 145-158, November 1974. 20 ref.

Descriptors: *Gravity waves, *Oceanography, Ocean currents, Water circulation, Mathematical models, Model studies, Theoretical analysis.

The influence of ocean currents on free internal gravity waves was discussed. The dependence of the parameters of gravity waves on the characteristics of stationary marine currents was described. The necessary conditions for existence of these waves were obtained, and the phenomenon of abrupt changes in phase of the internal oscillation with depth was explained. (See also W75-04729) (Sims-ISWS)
W75-04739

JURISDICTION OF SUBMERGED LANDS--GUAM, THE VIRGIN ISLANDS AND AMERICAN SAMOA.
For primary bibliographic entry see Field 6E.
W75-04783

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

THE WORLD'S LARGEST DESALTING COMPLEX--A REPORT ON TWENTY YEARS EXPERIENCE,
J. Reside, and A. M. S. Al-Adsani.
National Water Supply Improvement Association Journal, Vol 1, No 1, p 1-14, July 1974. 1 fig, 3 tab, 4 ref.

Descriptors: *Desalination, *Potable water, *Foreign research, *Desalination processes, Desalination apparatus, Desalination plants, Descaling, Desalination wastes, Water supply, *Distillation, Flash distillation, Electrodialysis, Evaporators.
Identifiers: *Kuwait.

Kuwait is the largest producer of desalted water in the world. Kuwait presently has 65 mgd of desalting plant capacity and plans another 12 mgd by 1975. The first municipal desalting plant was built in 1953. The original desalting units were the submerged tube type distillation process. The first multistage flash desalting plant was installed in 1960. Currently there are three main plant sites with 24 individual desalting units distributed among them. The units have capabilities ranging from 0.6 to 6.0 mgd. The design, operating procedures, and experiences of these units are described. The by-product recovery and water distribution systems are also described. By-products produced include hydrogen, chlorine, sodium hydroxide, sodium chloride, and hydrochloric acid. Chemical treatment used to reduce the scale formation in the desalting units consists of a mixture of tri-polyphosphate, lignum sulphonate and anti foam. The plants are cleaned manually by water washing and by rods and brushes or they can be cleaned by acid washing. The advanced use of desalting technology in Kuwait has made available an inexpensive supply of electricity and potable water from the sea. (Orr-FIRL)
W75-04422

GEOTHERMAL WELLS IN IMPERIAL VALLEY, CALIFORNIA: DESALTING POTENTIALS, HISTORICAL DEVELOPMENT, AND A SELECTED BIBLIOGRAPHY,
N. El-Ramly, R. E. Peterson, and K. K. Seo.
National Water Supply Improvement Association Journal, Vol 1, No 1, p 31-38, July 1974. 1 fig, 1 tab, 26 ref.

Descriptors: *Geothermal studies, *Desalination, *Energy, *Brines, Brine disposal, Corrosion, Scaling, Temperature, Thermal water, Heat transfer, *California, Potable water.
Identifiers: *Imperial Valley(Calif).

Possible solutions to future water shortages include wastewater reclamation, importation, and desalting of sea or brackish water, but all of these are energy-intensive and energy is also in short supply. A potentially important source of readily available energy is geothermal brine, which is an underground resource found in abundance in the Imperial Valley, California. The background of geothermal well drilling in the Imperial Valley region is presented. Field research is being performed in the areas of heat-exchange technology and geothermal desalting. Brine disposal has been one problem holding back geothermal development. About two pounds of brine are produced for every pound of steam generated. The corrosive and scaling nature of the geothermal brines have stopped large scale commercial development so far. One process appears to offer promise for future developments; the Magmama power process is a vapor-turbine cycle. Hot brine is pumped up from the geothermal reservoir and the phase change of water to steam is suppressed. The brine is cooled in a heat exchanger where it heats a secondary fluid with a low boiling point, such as isobutane or freon, which is then used to drive a turbogenerator in a closed cycle. The cooled brine is injected into a well to maintain the underground reservoir pressures. The establishment of the feasibility of geothermal power in Imperial Valley will provide electrical energy and will better the prospects of a dual purpose geothermal power-desalting project in the Valley. (Orr-FIRL)
W75-04423

UTILIZATION OF THE EARTH'S NATURAL HEATING SYSTEM TO DESALT GEOTHERMAL BRINES FOR AUGMENTATION OF THE COLORADO RIVER SYSTEM,
Bureau of Reclamation, Boulder City, Nev. Region 3.
E. A. Lundberg.
National Water Supply Improvement Association Journal, Vol 1, No 1, p 39-51, July, 1974. 9 fig, 3 tab.

Descriptors: *Geothermal studies, *Desalination, *Brines, *Energy, Thermal water, Potable water, Water resources development, Water quality control, *California, Water supply, Colorado River Basin.
Identifiers: *Imperial Valley(Calif).

The available surface water supplies in the Colorado River Basin are being depleted by increasing agricultural demands and by an expanding population which is using water at a higher per capita rate. Water quality problems also exist in the Imperial Valley, California, because of the presence of highly saline soils and many saline springs which add significant quantities of salt to the river. Geothermal sources stored in the form of a hot brine underground in the Imperial Valley have the potential to yield economical new supplies of fresh water by desalting and also to yield mineral by-products and the production of electricity. A program for water production from the geothermal resources consists of three proposed stages: the research and development stage; the demonstration stage; and, the large-scale development stage. The research and development stage is now in progress and includes extensive geological, geophysical, and water chemistry investigations to determine the potential and extent of the geothermal resource. The demonstration stage would show the viability of large-scale development. The large-scale development stage is the fully operational stage which could augment the Colorado River by several million acre-feet of desalted water annually and would have an associated electric power production. Investigations completed include the drilling of two geothermal wells, one to 8030 feet and the other to 6005 feet and the installation of two desalting test units, a multistage flash unit and a vertical tube evaporator. The proposed next step is the construction of a pilot plant capable of processing 200,000 to 500,000 gallons per day. (Orr-FIRL)
W75-04430

PROCESS AND APPARATUS FOR SEPARATING WATER FROM NON-VOLATILE SOLUTES,
C. S. Smith, Jr.
U.S. Patent No 3,856,631, 10 p, 5 fig, 13 ref; Official Gazette of the United States Patent Office, Vol 929, No 4, p 1687, December 24, 1974.

Descriptors: *Patents, *Distillation, *Evaporation, *Electric powerplants, Fresh water, Sea water, Separation techniques, *Desalination.
Identifiers: *Heat of condensation, Immiscible liquids, Waste heat.

The apparatus and method for distilling aqueous solutions, especially saline water, for the purpose of producing fresh water are disclosed. A heat transfer medium in the form of a lower boiling immiscible liquid is employed in a manner to give up its latent heat of condensation directly to the solution. The resulting condensate is re-evaporated by heat from the resulting fresh water. In this process the immiscible liquid may be denser than, but preferably lighter than water. This method and apparatus can efficiently utilize the waste heat of a steam-electric power plant and is able to work between temperature limits of, for example, 60 deg. and 180 deg F. (Sinha-OEIS)
W75-04451

VERTICAL, MULTISTAGE-FLASH, FALLING FILM COLUMN FOR DISTILLING BRINE,
Societe General d'Entreprises, Paris (France). (assignee).
R. Barckhausen.
U.S. Patent No 3,859,173, 5 p, 8 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 930, No 1, p 421, January 7, 1975.

Descriptors: *Patents, *Distillation, *Flash distillation, *Desalination, *Waste water treatment, Equipment, Brine, Potable water, Prestressed concrete, Sea water.
Identifiers: Multistage-flash distillation.

A vertical distilling column is made of prestressed concrete. It is comprised of a vertical cylindrical casing, condensing means in its central part and a series of horizontal floors limiting, between them, a number of successive distilling chambers. Each chamber is characterized by the flow in a thin sheet of the brine to be evaporated on its vertical inside wall. Distilled liquid is conveyed on the vertical tubes of the condenser which is situated towards the center and on which are fixed the successive floating floors. The floors have cylindrical symmetry and are installed floating inside the casing. They have two opposite slopes, the one directing the brine towards the periphery, and the other directing the distilled liquid towards the center. Steam-tight sealing of the enclosure is necessary. The prestress necessary for ensuring fluid-tight sealing of the concrete is ensured in the vertical direction by the inside pressure, and in the horizontal direction by outside overpressure and by peripheral cables. (Sinha-OEIS)
W75-04459

METHOD AND APPARATUS FOR PRODUCING A DISTILLATE,
Fried-Krupp G.m.b.H., Essen (West Germany). (assignee)
K. D. Peter.
U.S. Patent No 3,856,632, 5 p, 3 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 929, No 4, p 1687, December 24, 1974.

Descriptors: *Patents, *Desalination, *Distillation, *Flash distillation, Brackish water, Sea water, Water treatment.
Identifiers: Multi-stage flash evaporator, Flash evaporators.

Improvements in a method of distilling raw water in a multistage flash evaporation system are described. The method includes preheating the raw water in condensers of the flash evaporator, partially evaporating the heated water in a plurality of evaporators connected to the flash evaporator, condensing the evaporated water in condensers connected to each evaporator stage, collecting the condensed vapor from each evaporator stage, removing inert gases from the evaporator stages by means of a vacuum pump (a water or steam ejector), and adding additional heat energy to the raw water by means of a tube-shell heat exchanger. The raw water is conducted from the condensers of the flash evaporator into at least one vertical tube evaporator to partially evaporate it by the addition of heat provided by a heating medium, which is the produced vapor of the vertical tube evaporator that has been removed, compressed to a higher temperature, and returned to the vertical tube evaporator by a heat pump means, to transfer its latent heat to the raw water. The condensed vapor is then passed as a distillate from the vertical tube evaporator to the flash evaporator to transfer part of its liquid heat by stepwise evaporation to the raw water being heated in the condensers of the flash evaporator. The distillate is collected in the trough of the respective stages of the flash evaporator and mixed with distillate from the vertical tube evaporator and removed from the last stage of the flash evaporator. (Sinha-OEIS)
W75-04465

HYDRATE FORMING IN WATER DESALINATION,
Institute of Gas Technology, Chicago, Ill. (assignee)
D. L. Klass.
U.S. Patent No 3,856,492, p 7, 4 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 929, No 4, p 1651-52, December 24, 1974.

Descriptors: *Patents, *Desalination, *Hydration, Sea water, Potable water, Brines, Heat exchangers, Specific gravity, Gases.
Identifiers: *Heat of hydration, *Ice formation.

A process for water desalinization compirses the following steps: commingling in a hydrate formation zone at a temperature above ice formation, brine and a heat-exchange liquid which is substantially immiscible with brine and water, has a specific gravity different from the specific gravities of brine, water and the range there between, and has a dissolved gaseous hydrating agent therein. The hydrating agent is capable of forming a solid hydrate having a specific gravity on the same side of both water and brine as the specific gravity of the heat-exchange liquid and is substantially insoluble in the heat-exchange liquid. The temperature, pressure or a combination of them is adjusted to form a solid hydrate. A portion of the heat of hydration is absorbed by the heat-exchange liquid. Concentrated brine is withdrawn from the hydrate formation zone. The heat-exchange liquid and solid hydrate are withdrawn from the hydrate formation zone to a hydrate decomposition zone. The solid hydrate, aided by the heat of hydration, is transferred directly from the heat-exchange liquid in the decomposition zone, into water and gaseous hydrating agent. The heat-exchange liquid containing gaseous hydrating agent is separated from desalinized water. (Sinha-OEIS)
W75-04466

UNIVERSAL DESIGN OF A 2.5 MGD UNIVERSAL DESALTING PLANT, REVISED: VOLUME 1.
Burns and Roe, Inc., Oradell, N.J.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 920, $7.25 paper copy, $2.25 microfiche. Revised 1974 edition of June 1969, Volume I - Report (193p); Volume II - User's Manual - Part I (92p); Volume III - User's Manual - Part II (144p); Volume IV - Bidding Specification (101p); and Volume V - Technical Specification (288p).

Descriptors: *Desalination plants, Desalination processes, Design criteria, *Flash distillation, *Specifications, *Design standards, *Evaporators, Potable water, Water management(Applied), Treatment facilities, *Fabrication, Water treatment, Waste water treatment.

Design criteria and associated prototype specifications and drawings provide engineers skilled in the water management field with sufficient detailed engineering information to specify, purchase and install a multi-stage flash desalination plant in any location which will produce 2.5 MGD of potable water. Sufficient guidance in operation and startup is provided so that skilled engineers can successfully operate such a plant. The work is limited to the design, specification and cost analysis of the desalting plant only. The large variety of saline water sources, heat sources an distribution arrangements possible precludes their consideration, and so the desalting plant design must be skillfully integrated into the complex by engineers who represent the sponsoring public authority. The revised technical specifications and the user's manual provide information in complete detail to select, specify, purchase and install the desalting plant. The drawings provide all the information needed by steel fabricators to construct the evaporator. The evaporator will deliver the desired potable water output provided additional skills, such as tube rolling, tube sheet machining and other similar work, are available in certain specialized areas. Available from the National Technical Information Service, Springfield, Va. 22161 as PB-239 919-SET, $29.00. Also available as PB-239 920(Vol. 1, $7.25); PB-239 921(Vol. 2, $5.25); PB-239 922(Vol. 3, $7.50); PB-239 923(Vol. 4, $5.25); PB-239 924(Vol. 5, $8.75). Each volume available in microfiche at $2.25 each.
W75-04850

3B. Water Yield Improvement

CONTROL OF GAMBEL OAK WITH THREE HERBICIDES,
Utah State Univ., Logan. Dept. of Plant Science.
G. A. Van Epps.
Journal of Range Management, Vol 27, No 4, July 1974. p 297-301, 3 fig, 1 tab, 13 ref.

Descriptors: *Water yield improvement, Large watersheds, Soil treatment, Herbicides, Oak trees, Ranges, Range grasses, Foliar application, Soil types, Soil water, Utah, Water yield, 2-4-D, 2-4-5-T, Defoliants.
Identifiers: Gambel oak, Picloram, Fenuron.

Prior studies have indicated that Gambel oak (Aqercus gambellii Nutt.) is a species found on watersheds in the Western United States that is a high user of water. Eradication of this species on important watersheds may increase water yields and improve the value of forestry, grazing, and recreation. Three herbicides were applied to Gambel oak on study sites on various exposures and soil types in central Utah. Picloram, fenuron, and phenoxy compounds were applied at various rates and mixtures as soil treatments and foliar treatments in order to attain complete kill of the plant. Fenuron was the only reliable chemical that killed Gambel oak at rates used, but also caused sterilization of the soil and consequent elimination of desirable plants. Foliar spraying with a mixture of picloram and the 2,4-D and 2.4,5-T compounds showed promise in killing Gambel oak crowns. This would open up the rangeland for additional grazing but would contribute little to increased water yields on the watershed. Additional studies are needed to find effective techniques that are more selective in controlling Gambel oak. (Mastic-Arizona)
W75-04366

MANAGEMENT OF PHREATOPHYTE AND RIPARIAN VEGETATION FOR MAXIMUM MULTIPLE USE VALUES,
Forest Service (USDA), Port Collins, Colo. Rocky Mountain Forest and Range Experiment Station.
J. S. Horton, and C. J. Campbell.
Research Paper RM-117, 23 p, April, 1974. 1 tab, 6 fig, 91 ref.

Descriptors: *Phreatophytes, *Southwest U.S., Riparian water loss, Floodplains, Evapotranspiration, *Groundwater, *Evapotranspiration control, Riparian plants, Riparian rights, Flood control, Arroyos, Recreation, Antitranspirants, Perennail streams, Water table, Cottonwoods, Mesquite, Wildlife, Grazing, Multiple purpose, Floodplain zoning, Watershed management.

Information about the relations of vegetation along water courses in the southwestern United States, and impacts on resource values of vegetation management to reduce evapotranspiration is presented. Literature is reviewed on measurement and evaluation of water losses, ecological relationships, usage of phreatophyte areas, and methods for control of phreatophytes. Approaches to floodplain management are discussed, based on floodplain zones which are defined primarily by water table depth, elevation, and tree species. Optimum management requires consideration of both environmental factors and economic needs of the area. Only rarely are there phreatophyte areas in the Southwest that would be best managed by complete vegetation conservation. (Mastic-Arizona)
W75-04379

WOOD BORING INSECT INFESTATIONS IN RELATION TO MESQUITE CONTROL PRACTICES,
Texas Tech Univ., Lubbock. Dept of Range and Wildlife Management.
D. N. Ueckert, and H. A. Wright.
Journal of Range Management, Vol 27, No 5, p 383-386, September, 1974. 4 fig, 2 tab, 13 ref.

Descriptors: *Insects, *Mesquite, *Water yield improvement, *Burning, 2-4-5-T, *Range management, Forage grasses, Texas, Brush control, Moisture content.
Identifiers: *Wood boring insects, Girdling.

Mesquite trees that are infested by wood boring insects are much easier to burn down than uninfested trees. Six different methods of killing mesquite were studied to determine which treatments enhance borer activity. In addition to the control, treatments included aerial spray of 2,4,5-T, and girdling. Basal spraying with diesel oil at 2,4,5-T and girdling resulted in the most significant increase in wood borer activity. Basal spraying with diesel oil and burning resulted in intermediate borer activity; felled trees produced slight activity; and insignificant activity was found in trees sprayed with 2,4,5-T and the control. The use of mesquite control practices which enhance wood borer activity followed by prescribed burning can produce a significant increase in forage production and quality. (Mastic-Arizona)
W75-04380

MORE WATER FOR ARID LANDS, PROMISING TECHNOLOGIES AND RESEARCH OPPORTUNITIES.
Ad Hoc panel of the Advisory Committee on Technology Innovation, Board on Science and Technology for International Development, Commission on International Relations.
National Academy of Sciences, Washington, D.C. 1974. 153 p, 77 fig, 16 chapters, Arabic, French, and Spanish summaries.

Descriptors: *Water harvesting, *Water conservation, *Arid lands, *Irrigation programs, *Irrigation efficiency, Rainfall stimulation, Transpiration control, Evaporation control, Groundwater mining, Artificial recharge, Irrigation, Irrigation water, Water reuse, Percolation, Technology, Desalination, Runoff, Wells, Water wells, Dug wells, Remote sensing, Saline water.
Identifiers: Runoff farming.

Arid lands have an underexploited agricultural potential. This report presents a number of promising technologies and research opportunities which may play a role in supplying needed water. Two approaches are considered: increasing the supply of usable water, and reducing the demand for water. Technologies discussed include: rainwater harvesting, runoff agriculture, irrigation with saline water, reuse of water, wells, other sources such as desalting, weather modification and groundwater mining, evaporation reduction, seepage loss, trickle irrigation, innovative irrigation methods, reduction of percolation losses, transpiration reduction, use of more water-efficient plants for agriculture, controlled-environment agriculture, and some promising water conservation techniques such as artificial recharge of groundwater. (Mastic-Arizona)
W75-04508

WATER RIGHTS AND ASSESSMENTS, (PROPOSALS INVOLVING ANTARCTIC ICEBERGS FOR THE COLORADO RIVER BASIN, CALIFORNIA, MEXICO AND OTHER ARID LANDS),
J. L. Hult.
(Rand Corporation), p 5271, July, 1974. 14 p, 5 ref.

Descriptors: *Water resources development, *Water supply development, *Arid lands, *Icebergs, Water rights, Water allocation(Policy), Water quality, Water law, Cost allocation, Antarctic, Water costs.

Some principles are presented with the purpose of proposing solutions to water rights and cost allocation problems associated with the use of Antarctic icebergs as a fresh water resource in the Colorado River Basin, California, Mexico, and other arid lands. The adoption of the proposed principles would provide unrestricted nondiscriminitory access to water anywhere and would therefore facilitate the initiation and evolution of water use for the greatest world-wide economic benefit. It would relieve the unfair competition and subsidy from established water users, recognize the value of water quality, and offer opportunities to improve water quality. The principles offered would encourage the development and implementation of new technologies and enable the employment of the world's largest reserves of fresh water, the Antarctic icebergs which would otherwise continually waste away. (Mastic-Arizona)
W75-04610

INADVERTENT RAIN MODIFICATION AS INDICATED BY SURFACE RAINCELLS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 2B.
W75-04703

AN ASSESSMENT OF WARM FOG - NUCLEATION, CONTROL, AND RECOMMENDED RESEARCH,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering; and Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
For primary bibliographic entry see Field 2B.
W75-04717

ATMOSPHERIC WATER RESOURCES MANAGEMENT PROGRAM - BRIDGER RANGE CLOUD SEEDING EXPERIMENT,
Montana State University, Bozeman. Dept. of Earth Sciences.
A. B. Super, J. A. Heimbach, J. T. McPartland, and V. L. Mitchell.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-234 012, $10.50 in paper copy, $2.25 in microfiche. REC-14-06-D-6798, p 416, April 15, 1974. 15 fig, 54 tab, 32 ref, 3 append. Contract No 14-06-D-6798.

Descriptors: *Cloud seeding, *Artificial precipitation, Artificial storms, Precipitation(Atmospheric), Meteorology, Precipitation gages, Radiosondes, Snow management, Storms, Weather, *Weather modification, Winds, Meteorology, Clouds, Silver iodide, Topography, Snow packs, Water equivalent, Snowfall, Orography, *Montana, Water resources.
Identifiers: Silver iodide generators, *Bridger Range(Mont).

Discussed were winter cloud seeding experiments conducted in the Bridger Range of southwestern Montana, and the analysis of a three-winter radomized seeding experiment. Also considered was airborne plume tracing of silver iodide over and downwind of the Bridger Range, confirming earlier work indicating that tareting was usually successful with westerly flow. Several studies discussed support the statistical analysis of the randomized cloud seeding experiment. These include a stepwise multiple regression analysis relating nonseeded precipitation to upper air parameters. Cloud thickness was most closely related to snowfall of the parameters considered in this analysis. Snowfall amounts and frequency were greatest during nighttime at mountain stations. Pooling daytime and night-time 6-hour precipitation totals to increase sample size for statistical analysis was not valid. Attempts to utilize a target-control analysis were unseccessful due primarily to lack of a control gage adequate for this type of analysis. Application of nonparametric statistical tests to 6-hour precipitation totals did not indicate seeding effects. (Jones-ISWS)
W75-04721

GROUNDWATER PUMPAGE IN NORTHERN ILLINOIS, 1960-1970,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 4B.
W75-04727

AUTHORIZING THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN THE EAST GREENACRES UNIT, RATHDRUM PRAIRIE PROJECT, IDAHO, AND FOR OTHER PURPOSES.
Committee on Interior and Insular Affairs (U. S. House).
For primary bibliographic entry see Field 6E.
W75-04787

3C. Use Of Water Of Impaired Quality

THE WORLD'S LARGEST DESALTING COMPLEX--A REPORT ON TWENTY YEARS EXPERIENCE,
For primary bibliographic entry see Field 3A.
W75-04422

NITROGEN MASS BALANCE DETERMINATION FOR SIMULATED WASTEWATER LAND-SPREADING OPERATIONS,
Texas Tech Univ., Lubbock. Water Resources Center.
For primary bibliographic entry see Field 5D.
W75-04449

SILICON CONTENT OF WHEAT HUSKS IN RELATION TO WATER TRANSPIRED,
Commonwealth Scientific and Industrial Research Organization, Glen Osmand (Australia). Div. of Soils.
For primary bibliographic entry see Field 2D.
W75-04484

MORE WATER FOR ARID LANDS, PROMISING TECHNOLOGIES AND RESEARCH OPPORTUNITIES.
Ad Hoc panel of the Advisory Committee on Technology Innovation, Board on Science and Technology for International Development, Commission on International Relations.
For primary bibliographic entry see Field 3B.
W75-04508

STABILIZATION OF AEOLIAN LANDS IN SAUDI ARABIA'S AL HASA OASIS,
Durham Univ. (England).
J. H. Stevens.
Journal of Soil and Water Conservation, Vol 29, No 3, May-June 1974. p 129-133 4 fig, 3 ref.

Descriptors: *Aeolian soils, *Soil stabilization, *Windbreaks, *Tamarisk, Soil physical properties, Saline soils, Saline soil treatment, Water, Dunes, Irrigation, Dune sands, Reclamation.
Identifiers: *Saudi Arabia, Oases.

Reclamation on the cultivated portion of the oasis has been accomplished through soil stabilization techniques and planting of Tamarix aphylla, which was selected because it requires no irrigation after three or four years due to its deep rooting system. It is fast growing and can be propagated successfully with cuttings. The species can withstand high winds and wide temperature extremes; and is tolerant to drought and to the use of saline water. Water is supplied by artesian flow which appears in numerous springs. In addition to stabilizing moving dunes, these projects provide secondary benefits including: a small timber industry, recreation facilities, improved microclimate, especially the reduction of wind speed, and a reduction of insect-bourne deseases due to elemination of many saline swampy areas. (Mastic-Arizona)
W75-04512

DRAINAGE FOR AGRICULTURE,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
For primary bibliographic entry see Field 3F.
W75-04537

WATER MANAGEMENT SYSTEMS,
Technion--Israel Inst. of Tech., Haifa.
For primary bibliographic entry see Field 3F.
W75-04538

3D. Conservation In Domestic and Municipal Use

CONTROL STRATEGY DEVELOPMENT STUDY, SAN FRANCISCO WASTEWATER MASTER PLAN,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-04352

REGULATION OF URBAN DEVELOPMENT TO CONTROL RUNOFF AND EROSION,
Pennsylvania Univ., Philadelphia. Inst. for Environmental Studies.
For primary bibliographic entry see Field 4D.
W75-04362

ASCE URBAN WATER RESOURCES RESEARCH PROGRAM, 1967-1974,
American Society of Civil Engineers, New York.
For primary bibliographic entry see Field 4A.
W75-04440

A METHOD FOR DETERMINING PEAK FLOWS AND DETENTION STORAGE REQUIREMENTS IN URBANIZING AREAS.
Soil Conservation Service, Indianapolis, Ind.
For primary bibliographic entry see Field 4A.
W75-04694

INVESTIGATION OF LAND USE OF NORTHERN MEGALOPOLIS USING ERTS-1 IMAGERY,
Dartmouth Coll., Hanover, N.H. Dept. of Geography.
For primary bibliographic entry see Field 7C.
W75-04726

THE URBAN REGION PLAN: SAINT JOHN, (NEW BRUNSWICK), URBAN REGION IMPACT STUDY.
Proctor, Redfern, Bousfield and Bacon, Saint John (New Brunswick).
For primary bibliographic entry see Field 6B.
W75-04756

A COMPENDIUM OF INFORMATION, (THE METROPOLITAN TORONTO AND REGION CONSERVATION AUTHORITY).
Metropolitan Toronto and Region Conservation Authority, Woodbridge (Ontario).
December 31, 1972. 102 p, 1 map, 49 ref.

Descriptors: Conservation, *Water conservation, *Flood control, *Land management, *Resources development, *Canada, Fish conservation, Wildlife conservation, Forest management, Land use, Lake Ontario, *Comprehensive planning.
Identifiers: *Toronto(Canada).

The Authority, created by the national government to develop a comprehensive program of resource management, has jurisdiction over 1126 square miles, an area defined by the watersheds of all streams entering Lake Ontario between Etobicoke and Carruthers Creek. Its 55 appointed members formulate and administer programs through 10 boards which deal with various conservation areas. Much of the enforcement depends on funding by the government. Accomplishments and goals are outlined for: flood control and water conservation; reforestation and land used including fish and wildlife management; recreation program; a water development program; land acquisition, acquisition and development of Niagara escarpment, information and education, historical planning; and ancillary conservation measures. The financial foundation of the Authority and its relationship with the different levels of government are discussed. The Metropolitan Toronto and Region Waterfront Plan 1972-76 undertaken by the Authority, prepared on the basis of $4 million per year expenditure for 5 years, is now operative and involves acquisition and development of sites for land fills, parks, conservation areas. The policy of the Authority concerning the planning, development and management of the waterfront of Lake Ontario is given. All of the proposed projects will be carried out within the context of planning and land use controls in force which, under the Planning Act, are administered by the municipalities in which the works are to be located. (Salzman-North Carolina)
W75-04760

LIVING CITY, (MELBOURNE, AUSTRALIA, REVIEW OF OPERATIONS, 1972-73).
Melbourne and Metropolitan Board of Works, (Australia).
Report No 14, Spring/Summer 1973. 24 p, 9 fig, photos.

Descriptors: Water resources, *Planning, Forest watersheds, Runoff, *Water supply, *Water storage, *Sewers, *Reservoirs, Expenditures, Hydrology, Electricity, Electrolysis, Corrosion, Preservation, Dams, Environment, Sites, Administration, Efficiency, Capital costs, Budgeting, *Australia, Water yield improvement.
Identifiers: *Melbourne(Aust), Water retriculation, Policy analysis, Creeks, Cardinia Reservoir(Australia), Renewal.

Eight articles relating to water resources in the Melbourne area are summarized: (1) In order to evaluate the present policy of closed or single use catchments for managing the limited areas which yield water, the forestry staff of the Melbourne and Metropolitan Board of Works (MMBW) analyzes runoff from different types of forest areas, and conducts forest hydrology research to study vegetation-water relationships to determine whether a multiple use policy can be safely adopted without detriment to Melbourne's water supply. (2) Stray electricity from train and tram services creats a problem for water supply engineers due to electro-chemical corrosion of pipes of the water reticulation system. (3) A community clean-up group, coordinated by MMBW is working to change the creeks which have become rubbish choked eyesores back into parkland areas and storm water channels. (4) The Cardinia Reservoir experience provides insight into the planning that goes into the siting of a water storage dam, and once built, how the new environment is shaped. Important factors in site selection are reliable flow of water, topography, impermeable underlying rocks and soils, and availability of construction materials on site. (5) Renewal of original 80-year old sewers presented a problem. (6) The history of Melbourne's first reservoir, conceived by engineer James Blackburn and completed in 1857 is presented. (7) MMBW moved to new head office for 2,300 staff in August 1973, facilitating more efficient central administration and extended use of the computer. (8) Major expenditure in capital works program for 1973/74 is water supply augmentation and major sewerage works. Also included is a review of 1972/73 operations wherein capital expenditures exceeded $100 million. (Diefendorf-North Carolina)
W75-04762

HYDRAULIC ANALYSIS OF WINNIPEG SUMP INLETS,
Manitoba Univ., Winnipeg. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-04804

3E. Conservation In Industry

LIGNIN SEPARATION BY CONTINUOUS ION FLOTATION: INVESTIGATION OF PHYSICAL OPERATIONAL PARAMETERS,
Rutgers - the State Univ., New Brunswick, N.J.
For primary bibliographic entry see Field 5D.
W75-04476

WASTEWATER CHARACTERIZATION FOR THE SPECIALTY FOOD INDUSTRY,
American Frozen Food Inst., Washington, D.C.
For primary bibliographic entry see Field 5B.
W75-04560

SEPARATION, DEWATERING AND DISPOSAL OF SUGARBEET TRANSPORT WATER SOLIDS, (PHASE I),
American Crystal Sugar Co., Denver, Colo.
For primary bibliographic entry see Field 5D.
W75-04565

WATER RECYCLE/REUSE POSSIBILITIES: POWER PLANT BOILER AND COOLING SYSTEMS,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5D.
W75-04566

THE DESIGN AND PROMOTION OF A SCHEME USING MIXED WATER FROM THE RIVERS ANCHOLME, WITHAM AND TRENT FOR INDUSTRIAL SUPPLY TO HUMBERSIDE,
Rofe, Kennard and Lapworth, London(England).
M. Lindley, F. J. Bowyer, and H. S. Hawkins.
Journal of the Institution of Water Engineers, Vol 28, No 5, p 272-298, July, 1974. 3 fig, 7 ref.

Descriptors: *Water importing, *Water demand, *Water supply, *Water management(Applied), *Water conveyance, Water utilization, Water conservation, Water delivery, Economics, Rivers, Bodies of water, Inland waterways, Watersheds, Management, Planning, Economic impact, Industrial plants, *Industrial water, Costs.
Identifiers: *Inter-river transfer works, North Lincolnshire(Eng), River Ancholme(Eng), River Witham(Eng), River Trent(Eng), National Water Plan(Eng), New towns, Humberside(Eng).

To accommodate rising water demand for industrial purposes, a major inter-river transfer scheme involving two river authorities and the North Lindsey Water Board in England was devised. Transfers are first made from the river Witham, and then from the river Trent via the river Witham; this water transfers to the river Ancholme in North Lindsey. Water quality concerned industrialists, who need water for demineralization and cooling processes. The proposed source change required changes in the newly-constructed treatment plant, increasing costs for chemicals and water. To meet opposition by industrialists, the Water Board had to initiate the distribution system ahead of the intended schedule. A new town and rapid industrial development following construction of the Humber Bridge were forecast for the area by the National Water Plan, so flexibility in the scheme is important if it was to coincide with future water development. This scheme may be the forerunner for other similar programs, and lessons learned in its planning and operation should be valuable to future planners. Little was known, for example, about what effect the quality and cost of the supply would have on water demand. (Grden-North Carolina)
W75-04764

WASTEWATER ANALYSIS AND ITS RELATION TO COMPANY PROFITS,
Harnish and Lookup, Associates, Newark, N.Y.
For primary bibliographic entry see Field 5A.
W75-04817

3F. Conservation In Agriculture

USE OF LEAF RESISTANCE FOR PREDICTING IRRIGATION SCHEDULING,
Kansas State Univ., Manhattan. Dept. of Agricultural Engineering.
A. Chen.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 342, $4.25 in paper copy, $2.25 in microfiche. Kansas Water Resources Research Institute, Master's Thesis, 56 p, 1972. 21 fig, 2 tab, 3 append 42 ref. OWRT A-044-KAN(1).

Descriptors: *Soil water, *Sorghum, *Irrigation, *Sprinkler irrigation, *Soil-water-plant relationships, Leaves, Soil moisture, Tensiometers, Transpiration, Water requirements, Meteorological data.
Identifiers: Soil water potential, Leaf diffusion porometer.

Objectives of this study were to find the characteristics of leaf resistance in sorghum plants, to develop a relationship between soil water potential and leaf resistance, and to evaluate the use of leaf resistance as a criterion for irrigation scheduling. Leaf resistance was reassured both on field and potted plants by a leaf diffusion porometer. resistance was found to be high at the base of the leaf and low at the tip. The leaf resistance readings taken during the growing season were found to correspond closely with the soil water potential at 45 cm of depth. From potted plants measurements, a rapid increase in average leaf resistance occurred at a soil water potential of -5 to -6 bars. This corresponds to 50 percent of available soil water, the level at which irrigation should be initiated to provide adequate moisture for optimum grain growth. (Mastic-Arizona)
W75-04351

EFFECTS OF AGRICULTURAL ACREAGE REDUCTION ON WATER AVAILABILITY AND SALINITY IN THE UPPER COLORADO RIVER BASIN,
Colorado Univ., Boulder. Dept. of Economics.
For primary bibliographic entry see Field 6B.
W75-04368

IRRIGATION, ROW WIDTH, AND PLANT POPULATION IN RELATION TO GROWTH CHARACTERISTICS OF TWO SOYBEAN VARIETIES,
Auburn Univ., Ala. Dept. of Agronomy and Soils.
B. D. Doss, and D. L. Thurlow.
Agronomy Journal, Vol 66, No 5, p 620-623, September-October, 1974. 5 tab, 2 fig, 8 refs.

Descriptors: *Irrigation, *Plant populations, *Alabama, *Crop production, Soil water, Soybeans, Stress, Regime, Plant growth, Field capacity, Southeast U.S.

Water stress at critical growth periods appears to be one of the most frequent limiting factors in soybean production. The effects of soil water, row width, and plant population on water use, growth rate, and bean yields of two soybean varieties were examined in central Alabama. Irrigation and bean variety influenced bean yields more than row width or plant population which showed little influence. Water use rates by soybeans were affected more by soil water regime than high irrigation amounts. Soybean plants appear to recover quickly even after showing severe signs of water stress by wilting or slow growth rate. This characteristic reduces the chances of a high response to irrigation. It is doubtful that irrigation of soybeans would be economical in most years. (Mastic-Arizona)
W75-04369

PATTERN OF WATER AVAILABILITY AND WATER REQUIREMENT FOR GRAIN SORGHUM PRODUCTION AT SAMARU, NIGERIA,
Institute for Agricultural Research, Zaria(Nigeria).
J. Kowal, and D. J. Andrews.
Trop Agric. Vol 50, No 2, p 89-100. 1973 Illus.
Identifiers: Climates, *Grain sorghum, Growth rates, Hybrids, Irrigation, *Nigeria(Samaru), Rainfall, Sensitivity, Soils, Sorghum-bicolor, Temperature, *Crop production, *Water requirements, *Water availability.

The performance of rain-fed sorghum (S. bicolor (Moench)) in a dry sub-humid region of northern Nigeria is analyzed in terms of adaptability to climate with particular reference to crop water availability. The water requirement of a 'Short Kaura' sorghum crop is about 700 mm. The average annual rainfall of 1100 mm is distributed over 140 to 160 days. The water storage capacity of the soil is adequate to provide the water requirements of sorghum after the end of the rains and to extend the growing season by about 60 days. The pattern of the crop water requirement is then well matched to the pattern of water availability for rain-fed sorghum production. The indigenous long season sorghum varieties are photosensitive and their heading coincides with the end of the rains when grain formation is dependent on the reserves of stored soil moisture. These varieties have a low grain yield potential and the period of vegetative growth is too long for efficient grain production at high levels of fertility. High growth rates during the 1st 9 wk suggest that the crop could be used for forage production. Non-photosensitive exotic sorghums (i.e., American hybrids and combine varieties) have short seasons relative to Nigerian varieties and give high grain yields, but a quality unacceptable for human consumption in Nigeria. Sown at the beginning of the rains, the crop matures at the peak of the rainy period rendering harvest difficult. Because of wet harvest conditions the grain quality is poor. Late sown crops are difficult to establish; the yields are lower than those from early sowings. Production of local sorghums under irrigation during the dry season is not possible at Samaru because of low temperatures.--Copyright 1974, Biological Abstracts, Inc.
W75-04384

CHANGES IN TRANSPIRATION, NET CARBON DIOXIDE ASSIMILATION AND LEAF WATER POTENTIAL RESULTING FROM APPLICATION OF HYDROSTATIC PRESSURE TO ROOTS OF INTACT PEPPER PLANTS,
Connecticut Univ., Storrs. Dept. of Plant Science.
B. E. Janes, and G. W. Gee.
Physiol Plant, Vol 28, No 2, p 201-208, 1973, Illus.
Identifiers: Aperture, Capsicum-annuum, *Carbon dioxide, Flow, Hydrostatic pressure, Light, Mesophyll, *Pepper plants, Roots, Stomatal, *Transpiration, *Leaf water potential, Absorption.

Hydrostatic pressures varying from 0-6.0 bar were applied to roots of intact Capsicum annuum L. cv. 'California Wonder' plants growing in nutrient solution and the rates of transpiration, and net CO2 assimilation, apparent compensation point and leaf water potential measured. Increasing the pressure on the roots of plants with roots in solution with either -0.5 or -5.0 bar osmotic potential with 1 bar increments resulted in a decrease in transpiration. With the application of 1 or 2 bar pressure the rate of transpiration returned to near

or above the original rate. An application of 3 or 4 bar pressure reduced the rate of transpiration of all plants. The transpiration of plants with roots in solution with -0.5 bar osmotic potential remained at the reduced rate for as long as these pressures were maintained. The transpiration of plants with roots in solution with -5.0 bar was only temporarily suppressed at these pressures. Changing the applied pressure from 3 or 4 bar to 0 resulted in a rapid increase in transpiration which lasted approximately 15 min. This was followed by a decrease in transpiration to a rate lower than before the pressure was applied. The pattern of response was similar for plants at low or high light intensity or at normal or low CO2 concentrations. When leaf diffusive resistance was 6.0 s cm to the minus 1 or greater, changes in net CO2 assimilation were similar to those of transpiration. The apparent CO2 compensation point increased as pressure was applied and decreased with a release in pressure. Leaf water potential increased with an increase in pressure and decreased with a decrease in pressure.--Copyright 1974, Biological Abstracts, Inc.
W75-04399

EFFECTIVENESS OF TWO NITRIFICATION INHIBITORS FOR ANHYDROUS AMMONIA UNDER IRRIGATED AND DRYLAND CONDITIONS,
Agricultural Research Service, Pullman, Wash.
For primary bibliographic entry see Field 5G.
W75-04425

WINCH-DRIVEN IRRIGATION APPARATUS,
CH2O, Inc., La Grande, Dreg. (assignee).
B. Courtright.
U.S. Patent No 3,848,805, 6 p, 7 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 928, No 3, p 1070, November 19, 1974.

Descriptors: *Patents, *Irrigation systems, *Water distribution(Applied), Equipment, Design, Application equipment.
Identifiers: Winch-driven apparatus.

The irrigation apparatus comprises: a horizontal frame provided with supporting wheels; an erect, water delivery structure mounted to the frame; and a drive line including a speed-reduction transmission having input and output drives. A water-pressure-to-revolving-mechanical-power converter has a water inlet structure constructed for coupling to an external water-carrying hose, a revolving output drive coupled to the transmission input drive, and a fluid outlet coupled to the fluid input of the water delivery structure. A winch drum journaled to the frame has an input drive coupled to the output drive of the transmission. The winch cable has its inner end upon the winch drum and the outer end constructed to extend forward of the frame to be anchored to an external object. A stop abutment on the cable simultaneously brakes the wheels and also the revolving output drive of the converter. (Sinha-OEIS)
W75-04452

EFFECT OF QUALITIES OF IRRIGATION WATER AND FERTILIZERS ON SOIL PROPERTIES, YIELD AND NUTRIENT UPTAKE BY WHEAT,
S.K.N. Coll. of Agriculture, Jobner (India). Dept. of Agricultural Chemistry and Soil Science.
P. Lal, and K. S. Singh.
Indian J Agric Sci, Vol 43, No 4, p 392-400, 1973. Illus.

Descriptors: Alkalinity, *Fertilizers, *Irrigation water, *Nutrients, Salinity, *Soil properties, Triticum-aestivum, Water quality, *Wheat yield, Absorption.

A field experiment was conducted for 2 yr with 3 types of water and 3 fertilizer levels on the same piece of loamy-sand soil with similar layout to determine the cumulative effect of poor quality or irrigation waters on wheat (Triticum aestivum L.). In both the years 'RS 3-1' cultivar was grown. At the end of the experiment, the ECe of the soil was less than the electrical conductivity (EC) of the irrigation water. After the rainy season, there was a drastic reduction in the ECe (EC of saturation extract) values of the soil. The SAR, pH and ESP (exchangeable Na percentage) of the soil at all depths increased with an increase in the SAR of the irrigation water. After the rainy season, there was a marked reduction in the SAR, ESP, pH and hydraulic conductivity values of the soil at all depths. The main effects of fertilizer doses on soil properties were significantly not different in both the years at all depths. The grain and straw yields and the uptake of N, P, K, Ca and Mg decreased with a rise in the EC and SAR of waters, but they increased with an increase in the level of fertilizers. The response of fertilizers on yields was negated when the salinity and alkalinity of the waters were excessively high (EC 7.0 mmhos/cm, SAR 25.97). Fertilization would be beneficial if the EC and SAR of water are up to 3.45 mmhos/cm and 16.73, respectively.--Copyright 1974, Biological Abstracts, Inc.
W75-04482

SUSCEPTIBILITY OF GRAIN SORGHUM TO WATER DEFICIT AT THREE GROWTH STAGES,
Texas A and M Univ., College Station. Dept. of Agricultural Engineering.
R. B. Lewis, E. A. Hiler, and W. R. Jordan.
Argon J, Vol 66, No 4, p 589-591, 1974.
Identifiers: *Grain sorghum, *Growth rates, Irrigation, *Soil water deficit, Sorghum-bicolor, Susceptibility, *Water loss, Crop production, Vegetation.

Susceptibilities of grain sorghum (Sorghum bicolor (L.) Moench, cv. 'Oro') to a moderately severe soil water deficit were determined. The crop susceptibility was expressed as the fractional reduction in yield caused by a given soil-water potential at a particular growth stage as compared with a well-watered control. The soil-water potential was allowed to drop to -12 to -13 bars during one stage of growth only, while being maintained above -0.7 bar during the remainder of the growing season. This level of soil-water deficit resulted in yield reductions of 17, 34 and 10% when the deficit occurred during the late vegetative to boot stage, the boot through bloom stage, and the milk through soft dough state, respectively. These values were compared with values calculated from data reported in the literature and discussed in terms of applicability in irrigation timing.--Copyright 1974, Biological Abstracts, Inc.
W75-04483

TRICKLE IRRIGATION SOIL WATER POTENTIAL AS INFLUENCED BY MANAGEMENT OF HIGHLY SALINE WATER,
Utah State Univ., Logan.
For primary bibliographic entry see Field 2G.
W75-04507

AN ECONOMIC ANALYSIS OF AGRICULTURAL LAND USE PRACTICES TO CONTROL WATER QUALITY,
Cornell Univ., Ithaca, N. Y.
For primary bibliographic entry see Field 5G.
W75-04526

THE DESIGN OF A LIVESTOCK WATER DISTRIBUTION SYSTEM--LARGE SCALE,
Nebraska Univ., Lincoln. Agricultural Experment Station.
H. R. Mulliner.
Transactions of the ASAE, American Society of Agricultural Engineering. Vol 17, No 3, p 436-439, May-June 1974. 2 fig, 3 tab, 4 ref.

Descriptors: *Water distribution(applied), *Design, *Planning, Livestock, Cost analysis, Economics, Engineering, Feasibility, Flexibility, Sites, Inspection, Water demand, Water requirements, Piping, Size, Pumping, Equipment, Materials, Construction, Operation and maintenance, Installation, Evaluation, Domestic water, Alternative planning, *Nebraska, *Distrubution systems.

The design procedure used to develop a large-scale livestock water distribution system for the U.S. Meat Animal Research Center in Nebraska is summarized. The format was general to allow system flexibility; however, minimums were considered to safeguard the final system operation and insure adequate sanitation. This format was divided into four phases. Phase 1 was general, wherein objectives were defined and available facilities and their requirements were recorded on a detailed map. Phase 2 was a specific site inspection; data were collected, capacities of existing facilities were determined, domestic water demands were estimated, fire protection and soil characteristics were examined, and alternative water system layouts were considered. Phase 3 was a preliminary report summarizing findings from Phase 2 and considering system design factors, such as: water demand and the demand interval; water delivery at design rate; peak water demand rates, pipe size, and pumping requirements; water quality standards; and type of piping and installation method. A cost analysis of equipment and pipes was completed to evaluate the alternative systems prior to recommending a system design to the Center. Phase 4 was the final engineering report, including all information pertinent to planning and installing the system. Installation-, operation-, and maintenance-flexibility were found to be the most important design considerations. Initial depreciation costs were considered secondary to functional operation of a water distribution system. (Bell-Cornell)
W75-04527

DEMAND FOR IRRIGATION: A CASE STUDY OF GOVERNMENT TUBE-WELLS IN UTTAR PRADESH,
Institute of Economic Growth, Delhi (India).
For primary bibliographic entry see Field 6D.
W75-04529

ADOPTION OF NETWORK TECHNIQUES IN THE PLANNING AND EXECUTION OF IRRIGATION AND POWER PROJECTS,
Hindustan Construction Col. Ltd., Bombay (India).
K. M. Kulkarni.
Irrigation and Power, Vol 30, No 3, p 273-288, July 1973. 6 fig, 4 tab.

Descriptors: *Irrigation, *Projects, *Planning, *Management, *Critical path method, *Scheduling, Rivers, Diversion, Diversion dams, Hydroelectric power, Construction, Computers, Costs, Mathematical models, Systems analysis, *Networks, Risks.
Identifiers: Network techniques, Project control, Site control, Power projects, Multiobjective.

'PERT' (Program Evaluation and Review Technique) and 'CPM' (Critical Path Method) are versatile planning and management tools which form a part of Network Management Technique (NMT). The introduction of network techniques to irrigation and power projects is discussed; also, the developments of CPM and its application to the Yamuna Hydro Electric Project, Stage II, by the Hindustan Construction Co. Ltd., in its work of river-diversion for construction of Ichari Dam. The network technique is admirably suited to the construction industry, particularly for river valley projects where the nature of project execution involves many processes and uncertainties and where the construction period is limited to only 6 to 8 months per year. In the construction industry, as the time estimates are more deterministic, CPM

is more often used. The use of CPM in project scheduling is discussed. The following aspects of network modeling are studied: drawing and preparing the network; the reporting system of progress of the model; feedback information for corrective measures for effective control of the project; and resource analysis. The use of PERT/COST in developing a project cost control plan is examined; the method is found to improve program management by providing more accurate forecasts of time and cost required to accomplish objectives and better measurement of progress in meeting the scheduled costs and technical objectives. Finally, the use of computers for PERT/CPM network management is considered. (Bell-Cornell)
W75-04533

PREDICTION OF DRAINAGE REQUIREMENTS -- BUYUK MENDERES RIVER BASIN, TURKEY,
California Univ., Davis. Dept. of Water Science and Engineering.
For primary bibliographic entry see Field 4A.
W75-04534

DRAINAGE FOR AGRICULTURE,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
Number 17 in the series AGRONOMY. American Society of Agronomy, Inc., Madison, Wisconsin, 1974. J. Van Schilfgaarde, Ed., p 700, 225 fig, 64 tab, 1,045 ref.

Descriptors: *Drainage, *Agriculture, *Flow, *Soils, *Water management(Applied), Crop production, Salinity, Land use, Design criteria, Humid areas, Materials, Construction, Saturated flow, Steady flow, Unsteady flow, Wells, Drains, Water table, Salts, Effects, *Water quality, Drainage water, Chemicals, Nutrients, Groundwater movement, Analog models, Hydraulic models, Digital computers, Finite element analysis, Soil properties, Networks, Mathematical models, Systems analysis, Europe, United States.
Identifiers: Flat areas, Drain tubes, Heterogeneous media, Drain envelopes, Drainage analogues, Finite difference methods.

This monograph is the second volume in a series devoted to drainage, the improvement of soil water conditions to enhance agricultural land use. It stresses developments in agricultural drainage since 1957 and covers a highly comprehensive area. The effects upon crop production of drainage and their translation into design criteria are discussed. Current engineering practices in the USA and Europe are reviewed and recent developments in construction techniques are described. Five chapters deal with the theory of drainage flow systems, attempting to interpret these theories in terms of practical applications. Current increased concern with water quality has led to the inclusion of a detailed discussion of soil and water quality in relation to drainage as well as of drainage water quality. The increasing availability of computers has warranted four chapters on physical and mathematical models, including analogues and hydraulics. The application of drainage theory requires a knowledge of the pertinent soil properties; the discussion herein emphasizes field methods and practical applications of theoretical concepts. Finally, the use of systems techniques to solve broad-based water management problems is considered. (Bell-Cornell)
W75-04537

WATER MANAGEMENT SYSTEMS,
Technion--Israel Inst. of Tech., Haifa.
N. Buras.
In: Drainage for Agriculture, Jan Van Schifgaarde, Ed., Number 17 in the Series AGRONOMY, American Society of Agronomy, Inc., Madison, Wis., 1974, p 675-694, 3 fig, 5 tab, 35 equ, 15 ref.

Descriptors: *Water management(Applied), Agriculture, *Drainage, *Irrigation, *Salt balance, *Soils, *Simulation analysis, *Design criteria, Root zone, Crops, Annual, Salinity, Precipitation, Evapotranspiration, Leaching, Hydrology, Arid lands, Evaluation, Optimization, Equations, Systems analysis, Mathematical models.
Identifiers: Systems engineering, Conjunctive operation, Moisture control, Uncertainty.

The design of soil moisture control systems should include comparison of possible alternatives and selection of the design which optimizes the decision criterion. This can be accomplished using an analytical model incorporating physical, engineering, probability and risk, and crop value aspects. Water management in agriculture is accomplished by fairly complex systems. The two major components of these systems are the irrigation subsystem and the drainage facilities. In order to insure the effectiveness of the entire system, these two components must be designed, constructed, and operated conjunctively. Systems engineering is used to analyze an irrigation-drainage problem where the salt balance in the root zone is an important aspect of the environment in which crops are grown. An annual model is derived, which indicates the changes in soil salinity during a yearly cycle as a function of the precipitation and irrigation quantities and salinity. To evaluate separately the effects of the natural precipitation and those of irrigation, a two-season model is developed, which may be used for designing water management systems. Finally, four sets of criteria for evaluating water management systems are identified and discussed: physical (technical), economic, social, and environmental. (See also W75-04537) (Bell-Cornell)
W75-04538

SURFACE WATER QUALITY IS INFLUENCED BY AGRICULTURAL PRACTICES,
Minnesota Univ., Morris.
For primary bibliographic entry see Field 5B.
W75-04548

AMENDING THE ACT OF JULY 4, 1955, AS AMENDED, RELATING TO THE CONSTRUCTION OF IRRIGATION DISTRIBUTION SYSTEMS.
Committee on Interior and Insular Affairs (U.S. Senate).
For primary bibliographic entry see Field 6E.
W75-04597

COMPARISON OF BANDED AND BROADCAST FERTILIZER APPLICATIONS IN RELATION TO COMPACTION AND IRRIGATION IN MAIZE AND WHEAT,
Punjab Agricultural Univ., Ludhiana (India). Dept. of Soils.
M. R. Chaudhary, and S. S. Prihar.
Agron J. Vol 66, No 4: p 560-564. 1974 Illus.
Identifiers: Banded fertilizers, Broadcast fertilizer, Compaction, *Fertilizers, Growth rates, Irrigation, Loan, Nitrogen, Nutrients, Phosphorus, Potassium, Sandy, Seed, Seedling, Soils, Tricitum-Aestivum, *Wheat, Zea-Mays, *Corn(Field), Absorption.

For maximum utilization of applied nutrients, the zone of nutrient concentration and root activity must synchronize. Since irrigation and compaction influence nutrient mobility and root configuration, their effect on growth and nutrient uptake were studied under different methods of fertilizer application in deep sandy loam and loamy sand soils. In studies with maize (Zea mays L.) and wheat (Triticum aestivum L.), fertilizer was banded or broadcast with and without irrigation and interrow compaction. Because seedling growth was faster when fertilizer was placed 20 cm below the seed, this treatment ultimately resulted in higher grain yield than when fertilizer was broadcast. In 1970, placement of fertilizer P was banded alone and increased corn yield by 40% while in 1971, placement of NPK increased maize yield by 170% over broadcast. The differences were greater with interrow compaction. Compared with broadcast, band placement of NPK increased the yield of irrigated wheat by 48% and 26% and that of unirrigated wheat by 288% and 150% with and without compaction, respectively. Treatment effects on nutrient uptake followed the same trends as those on grain yield. Fertilizer should not be broadcast where root growth in the surface layers is likely to be restricted due to surface drying or compaction. In compacted plots, heavy and infrequent irrigations appeared to be desirable because they resulted in significantly higher uptake of N. In the absence of compaction, nutrient uptake in the 2 irrigation practices was similar but grain yields were higher with frequent light irrigations than with frequent heavy irrigations. Copyright 1974, Biological Abstracts, Inc.
W75-04611

EFFECTS OF FERTILIZER AND AVAILABLE MOISTURE ON THE YIELD AND N AND P CONTENT OF WHEAT AND ON SOIL NUTRIENTS,
Department of Agriculture, Swift Current (Saskatchewan). Research Station.
W. C. Hinman.
Can J Soil Sci. Vol 54, No 2. p 187-193. 1974.
Identifiers: *Fertilizers, *Moisture content, Nitrate, *Nitrogen, Nutrients, *Phosphorus, Soil nutrients, Wheat, *Crop production.

That cher wheat was grown in tank-type lysimeters over a 7-yr period to determine the effect of fertilizer, 2 levels of available water and 2 cropping systems on the yield and nutrient content of grain and on some soil nutrients. Fertilizer did not change the yield of grain materially under natural rainfall. Added water only increased the yield by 1/2 and 3/4 of continuous wheat and fallow, respectively. Fertilizer with added water nearly doubled the yield of continuous wheat and increased by 1/3 the yield from the wheat-fallow rotation. The P content of the grain was not affected by fertilization, but was higher in the treatments to which additional water was applied than in those receiving natural rainfall only. It was also higher in continuous wheat than in fallow wheat. There was an interaction between the N and P uptake ratio and the N content of the grain. Fertilizer or additional water or both increased or decreased the N content, depending upon which way the N or P balance was shifted. Surplus available N not utilized by the crop grown with natural rainfall accumulated as nitrates at lower soil depths, particularly under the wheat-fallow system. Al the NO3-N produced where supplemental water or water and fertilizer were applied was utilized and non accumulated. The organic N content of the surface soil increased along with a reduced loss in organic C where water and fertilizer were applied, as compared to the other treatments. Fertilizer application resulted in a sharp increase in NaHCO3 soluble P, particularly following the supplemental water plus fertilizer treatments where an excess of P was supplied with the fertilizer over that removed by the crop. There was an increased demand on soil P where water only was applied, and the soluble P content was appreciably reduced. Copyright 1974, Biological Abstracts, Inc.
W75-04628

IRRIGATION FOR LAND APPLICATION OF ANIMAL WASTE,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W75-04638

PROCEDURAL METHODS FOR IMPLEMENTING COLORADO RIVER WATER CONSERVATION MEASURES.
Bureau of Reclamation, Washington D.C.
For primary bibliographic entry see Field 6E.

W75-04778

AUTHORIZING THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN THE TOUCHET DIVISION, WALLA WALLA PROJECT, OREGON-WASHINGTON, AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 6E.
W75-04790

MANURE PROMOTED FOR CROPLAND.
For primary bibliographic entry see Field 5G.
W75-04839

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

AN ANALYSIS OF FOREST WATER PROBLEMS IN GEORGIA,
Georgia Univ., Athens. School of Forest Resources.
For primary bibliographic entry see Field 4D.
W75-04356

THE BRANDYWINE: FIVE YEARS AFTER,
Pennsylvania Univ., Philadelphia. Inst. for Environmental Studies.
For primary bibliographic entry see Field 6B.
W75-04360

THE RISING WATER TABLE IN THE WEST NUBARYA AREA OF EGYPT,
International Inst. for Land Reclamation and Improvement, Wageningen (Netherlands).
For primary bibliographic entry see Field 4B.
W75-04363

FLOOD HAZARD REPORTS: TOOLS FOR RESOURCE PLANNING AND MANAGEMENT,
Soil Conservation Service, Grand Rapids, Mich.
T. A. Ringler, and J. H. Kennaugh.
Journal of Soil and Water Conservation, Vol 29, No 4, p 182-185, July/August, 1974. 2 fig, 8 ref.

Descriptors: *Flood plains, *Flood forecasting, *Flood data, *Flood control, Flood plain zoning, Flood plain insurance, Flood protection, Legislation, Regional flood, *Planning, *Management.
Identifiers: Flood plain management, Flood hazard reports.

The mechanics and advantages of flood hazard reports are discussed. Flood hazard studies consist of two major technical reports. The flood plain areas subject to flooding by select-frequency floods are outlined on aerial photomosaics and soil survey information that identifies the different types of soils within the flood-plain and its surroundings are also shown on the photomosaic maps. The reports contain soil descriptions and interpretative data. Flood hazard reports provide local and state governments and community residents with a technical basis for carrying out flood-plain management programs. Suggested nonstructural measures for flood-plain management resulting from legislation and flood hazard reports include flood-plain zoning ordinances, flood-plain development regulation, flood-plain filling regulation, flood insurance program, open space acquisition, upstream land treatment, and regional land use planning. Structural corrective measures include runoff-retarding dams, levees or walls, channel improvement, and flood-proofing. The key to developing technical data for flood planning programs is cooperation between city, county, regional, state, and federal agencies. Successful metropolitan resource management programs must ignore political boundaries. (Orr-FIRL)
W75-04432

ASCE URBAN WATER RESOURCES RESEARCH PROGRAM, 1967-1974,
American Society of Civil Engineers, New York.
M. B. McPherson, and G. F. Mangan, Jr.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 239 404, $3.75 paper copy, $2.25 microfiche. ASCE Urban Water Resources Research Program, Technical Memorandum No 25, October, 1974, 40 p, 13 ref. OWRT C-5045(4224)(1).

Descriptors: *Urbanization, *Research and development, *United States, *Local governments, *Comprehensive planning, *Water management(Applied), Abstracts, Surveys, Hydrologic aspects, Environmental effects, Water quality control, Social aspects, Operations, Data collections, Federal project policy, Systems analysis, Control system, Computer models, Instrumentation, International Hydrological Decade.
Identifiers: *Urban water resources, National assessment, Integrated management, Technology transfer, Information dissemination, National urban water policy, Metropolitan studies, Data needs, Innovation, Urban hydrology, Metropolitan areas.

Since 1967 the ASCE Program has served as the full-time operating arm of the American Society of Civil Engineers Urban Water Resources Research Council. The basic purpose of the Program is to help establish coordinated long-range research on urban water resources on a national scale. Briefly summarized is the progress made through mid-1974, on research needs assessment, urban water management, translation of research findings into practice, facilitation of urban runoff research, and collaboration and participation in research of local governments and other organizations. Also noted are activities scheduled for 1974-1975. Included are one-page abstracts for all twenty-eight Program reports and technical memoranda. (McPherson-ASCE)
W75-04440

CORRELATION OF HYDROLOGIC MODEL PARAMETERS WITH CHANGING LAND USE AS DETERMINED FROM AERIAL PHOTOGRAPHS,
Clemson Univ., S. C. Dept. of AGgricultural Engineering.
For primary bibliographic entry see Field 4C.
W75-04448

FLOATING WAVE BARRIER,
For primary bibliographic entry see Field 8A.
W75-04453

INFLATABLE BARRIERS FOR WATERCOURSES,
Pneumatiques, Caoutchouc Manufacture et Plastiques Kleber-Colombes (France). (assignee)
For primary bibliographic entry see Field 8A.
W75-04467

A FRAMEWORK FOR UNCERTAINTY MANAGEMENT IN WATER RESOURCES PLANNING,
Decision Sciences Corp., Jenkintown, Pa.
For primary bibliographic entry see Field 6B.
W75-04519

A TWO-DIMENSIONAL MULTI-STAGE PROGRAMMING MODEL: WITH APPLICATION TO RESERVOIR SYSTEMS,
Army Construction Engineering Research Lab., Champaign, Ill.
O. E. Rood, M. I. Dessouky, and D. D. Meredith.
November 1974, 27 p, 3 fig, 8 ref, append.

Descriptors: *Multiple-purpose reservoirs, *Dynamic programming, *Cost analysis, Flow, *Reservoir storage, *Hydrologic data, Water policy, Reservoir operation, Optimization, Constraints, *Networks, Equations, Algorithms, Evaluation, Mathematical models, Systems analysis.
Identifiers: Multi-stage programming, Time-and-distance programming, Grid size, Benefit maximization.

A simultaneous time- and distance-staged programming approach is developed for determining the optimal, time dependent, storage and flow policies in a network with only feed-forward flow connections and nonlinear cost functions. The approach is applied to a multipurpose reservoir system which is subject to time varying demands, prices, availabilities, and movement restrictions. The model is a two-dimensional extension of the concepts of dynamic programming through the definition of partial multidimensional recursive relationship. This reduces the size of the state space. The conditions for global optimality are presented, which include separable and concave cost functions. These conditions are seldom restrictive in the operating environment of large scale multipurpose reservoir systems. The computational results indicate that the approach is efficient in computer memory requirements and computation time. (Bell-Cornell)
W75-04523

EXPECTATION AND DISPERSION MATRICES FOR THE ESTIMATION OF DISTRIBUTIONS ASSOCIATED WITH DISCRETE RESERVOIRS,
Natal Univ., Durban(South Africa).
G. G. S. Pegram.
Journal of the Royal Statistical Society, Vol 36, No 2, p 299-304, 1974. 2 ref.

Descriptors: *Reservoir storage, *Stochastic processes, *Estimating, Reservoirs, Design, Markov processes, Equations, Mathematical models, Systems analysis, Disperion, Distribution systems.
Identifiers: *Stochastic reservoir theory, Linear approximations, Maximum likelihood, Input transition probability matrix.

Reservoir design problems involving chance fluctuations currently rely heavily on simulation for their solution. However, Stochastic Reservoir Theory, which employs finite Markov chains for the solution of problems associated with single reservoirs, is expressible in matrix form and thus lends itself to fast solutions using a digital computer. Stochastic Reservoir Theory can be useful in the analysis of small systems, as a precursor or an adjunct to simulation. In the case of a particular input transition probability matrix model, approximate expressions are found for the mean and dispression matrix of its elements and of the elements of the storage distribution for Moran and Lloyd reservoirs. The discussion is confined to stationary, non-seasonal models and is therefore to be regarded as only a preliminary survey. (Bell-Cornell)
W75-04525

THE DESIGN OF A LIVESTOCK WATER DISTRIBUTION SYSTEM--LARGE SCALE,
Nebraska Univ., Lincoln. Agricultural Experment Station.
For primary bibliographic entry see Field 3F.
W75-04527

COMPUTER USE FOR RIVER REGULATION,
Corps of Engineers, Portland, Oreg. North Pacific Div.
C. E. Abraham.
Journal of the Hydraulics Division, American Society of Civil Engineers Vol 101, No HY2, Proceedings paper No 11140, p 291-297, February 1975. 3 fig, 6 ref.

Descriptors: Water resources, *River regulation, *Hydrologic data, *Hydroelectric power, *Computer programs, *Simulation analysis, *Multiple-purpose reservoirs, Scheduling, Reservoir operation, Reservoir storage, Constraints, Streamflow, Design, Optimum development plans, Projects, Columbia River, Water policy, Forecasting, Equations, Mathematical models, Systems analysis.
Identifiers: *Computer applications, Data communication.

The complexity that occurs in regulating multiple-purpose reservoir systems has necessitated the use of computer programs for scheduling reservoir regulation. The need for real-time use of scheduling computer programs coupled with the aforementioned complexity has made automated regulation schemes and interactive computer processing highly desirable. The scheduling engineer must be able to examine easily the results of a trial computer simulation and modify operating constraints and forecasted information as necessary to retry the simulation. A package of stand-alone computer programs with interfacing capability is considered. These programs are used in real-time reservoir regulation and streamflow forecasting analyses in the North Pacific Division office of the Corps of Engineers. Since the simulated operation is sensitive to given target elevations, target ranges guide the operation along desired operating policies while recognizing physical system and project constraints. No optimization procedures are used, but experience indicates that the target technique used to simulate reservoir regulation coupled with the interactive computer processing features effectively provides a tool for finding optimum multiple-purpose operation policies within actual operating constraints. (Bell-Cornell)
W75-04531

OPTIMAL OPERATION OF MULTIPLE RESERVOIR SYSTEM,
State Univ. of New York, Buffalo. Dept. of Civil Engineering.
D. D. Meredith.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY2, Proceedings paper No 11128, p 299-312, February, 1975. 4 fig, 5 tab, 14 ref.

Descriptors: *Multiple-purpose reservoirs, *Reservoir storage, *Water management(Applied), *Dynamic programming, Economics, Flow, Water allocation(Policy), Constraints, *Optimization, Hydraulics, Recreation, Irrigation water, Water supply, Decision making, Reservoir releases, Equations, Algorithms, Mathematical models, Systems analysis, *Operations.
Identifiers: *Multiple reservoir systems, *Operating policy, Benefit maximization.

The operation of multiple purpose reservoirs located on a river is a complex problem if the reservoirs are to be considered as an integrated system. The water in the system has multiple beneficial uses, such as water supply, irrigation, low flow augmentation, recreation, power generation, and navigation. Excess water in the system can result in reservoir overtopping or in flooding along a reach of the river. Presented is a method for determining the quantities of water to be stored in each reservoir, the flow between reservoirs, and the amount of water to be allocated to each beneficial use such that the total return from the system is maximized for a selected sequence of stream inflows. The method is a facility stage discrete differential dynamic programming approach for determining the optimal operating policy for a multiple purpose multiple reservoir system. The approach was developed to take advantage of the congruity between the time and distance dimensions of the problem. The stages in the dynamic programming formulation are defined to represent reservoirs and the state variables are defined to represent the amounts of release from reservoirs. The approach requires that the problem be formulated such that stages in the algorithm represent reservoirs rather than times at which decisions concerning releases must be made. The method is applied to an example problem consisting of three serially linked multiple purpose reservoirs; all of the five different initial trial release policies tried converged to within 2% of the optimum obtained previously by gradient projection and conjugate gradient techniques. (Bell-Cornell)
W75-04532

PREDICTION OF DRAINAGE REQUIREMENTS -- BUYUK MENDERES RIVER BASIN, TURKEY,
California Univ., Davis. Dept. of Water Science and Engineering.
J. N. Luthin.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 6, p 1092-1094, 1973. 6 fig, 3 ref.

Descriptors: *Drainage, *Irrigation, Projects, *River basins, *Irrigation water, Water table, Perched water, Artesian aquifers, Pressure, Hydraulic conductivity, Groundwater, Water quality, Leaching, Water costs, Farms, Management, Soils, *Forecasting.
Identifiers: *Buyuk Menderes River Basin(Turkey).

The prediction of the ultimate extent and development of drainage problems following the introduction of irrigation water in new areas is always difficult due to inadequate data available for such analysis. Although improved methods are needed, present predictions are based mostly on judgment related to experience with existing irrigation projects. Factors influencing the rate of development of the formation of drainage problems in the Buyuk Menderes River Basin of Turkey are outlined. Such factors are: (1) soil stratification causing perched water table conditions; (2) artesian conditions, including depth to artesian aquifer and magnitude of artesian pressure; and (3) hydraulic conductivity of various soil strata. The Menderes River Basin area is described, and soils, topography and shallow stratigraphy, the quality of applied irrigation water, on-farm management, and present groundwater conditions are discussed. Finally, present and future drainage problems in the Basin are briefly considered. It is expected that, in the flooded lower basin area, the rate of installation will lag behind the need for drainage construction for a number of years. A systematic way of analyzing the situation is needed since drainage problems can be a substantial portion of total project cost. Presently, a rational method for calculating the drainage requirement must be tempered by experience because of the difficulty of evaluating all of the factors affecting the development of the drainage problem. (Bell-Cornell)
W75-04534

DRAINAGE FOR AGRICULTURE,
Agricultural Research Service, Riverside, Calif. Salinity Lab.
For primary bibliographic entry see Field 3F.
W75-04537

WATER MANAGEMENT SYSTEMS,
Technion--Israel Inst. of Tech., Haifa.
For primary bibliographic entry see Field 3F.
W75-04538

APPLICATION OF THE MAIN II WATER FORECASTING SYSTEM TO WYOMING COMMUNITIES,
Wyoming Univ., Laramie.
For primary bibliographic entry see Field 6D.
W75-04541

AQUATIC PLANT CONTROL PROGRAM, STATE OF FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 5G.
W75-04598

AQUATIC PLANT CONTROL.
For primary bibliographic entry see Field 6E.
W75-04599

FLOOD DISASTER PROTECTION ACT OF 1973.
For primary bibliographic entry see Field 6F.
W75-04600

REGULATION OF GREAT LAKES WATER LEVELS--APPENDIX E--COMMERCIAL NAVIGATION.
International Joint Commission-United States and Canada. Great Lakes Levels Board.
For primary bibliographic entry see Field 2H.
W75-04601

AUTHORIZATION FOR SECRETARY OF INTERIOR TO ACQUIRE ADDITIONAL WETLANDS.
Committee on Merchant Marine and Fisheries (U.S. House).
For primary bibliographic entry see Field 6E.
W75-04651

A METHOD FOR DETERMINING PEAK FLOWS AND DETENTION STORAGE REQUIREMENTS IN URBANIZING AREAS.
Soil Conservation Service, Indianapolis, Ind.
Indiana Technical Note Engineering-2, September 1973. 28 p, 8 fig, 4 tab, 1 ref. OWRR B-002-IND(7), and B-022-IND(3).

Descriptors: *Urban hydrology, *Urban runoff, *Urbanization, *Storage requirements, *Design flow, Storm runoff, Storage, Detention reservoirs, Hydrographs, Design flood, Statistical methods, Soil types, Rainfall-runoff relationships, Regression analysis, Indiana, Peak discharge, Small watersheds.
Identifiers: Instantaneous hydrographs.

A method was provided for computing the instantaneous peak flows for differing degrees of urbanization and runoff values for drainage areas between 10 and 600 acres. Relationships between runoff amounts, degrees of urbanization, reservoir release rates, and detention storage were presented. It was shown that the above relationships can be used to generate a complete unit hydrograph. The detention storage requirement was shown to be a function of the inflow hydrograph and the release rate of the detention structure. Factors for converting maximum release rates to normal release rates were presented for single stage pipe drop, orifice control, and weir drop spillway structures. (Terstriep-ISWS)
W75-04694

SEDIMENT TRAP EFFICIENCY OF SMALL RESERVOIRS,
Agricultural Research Service, Oxford, Miss. Sedimentation Lab.
For primary bibliographic entry see Field 2J.
W75-04702

INVESTIGATION OF LAND USE OF NORTHERN MEGALOPOLIS USING ERTS-1 IMAGERY,
Dartmouth Coll., Hanover, N.H. Dept. of Geography.
For primary bibliographic entry see Field 7C.
W75-04726

SPECIAL FLOOD HAZARD INFORMATION: CYPRESS CREEK, HARRIS COUNTY, TEXAS.
Army Engineer District, Galveston, Tex.
Prepared for Harris Soil and Water Conservation District, Houston, Texas, June 1972. 17 p, 1 fig, 4 tab, 10 plates.

Descriptors: Floods, *Flood control, *Flood protection, *Flood plains, *Flood plain zoning, *Texas, Flooding, Flood profiles, Flood frequency, Flood plain insurance.
Identifiers: *Cypress Creek(Tex), Harris County(Tex), Intermediate Regional Flood, Standard Project Flood, Flood prone areas.

Cypress Creek has a long history as a source of major floods in the Houston Metropolitan area. Sloping at 2.5 feet per mile, the stream bed adjoins flood plain of prairie land used for rice production and pasture in upper reaches and heavily wooded land undergoing residential and commercial development in lower reaches. Backwater from Lake Houston affects water surface elevation as well as flooding from intense local thunderstorms of short duration, rainstorms extending over periods of several days, or tropical storms with torrential rainfall. Long flood duration is caused by flat slopes and small channel capacities. Since the watersheds of Cypress Creek and adjacent Buffalo Bayou overlap giving an inaccurate account of Cypress Creek flood discharges, known data from coastal streams in the general geographical region and U. S. Weather Bureau data were used to compute larger flood discharges. Estimates for peak discharges of an Intermediate Regional Flood (IRF) and Standard Project Flood (SPF) were made at 34,420 cfs and 51,310 cfs, respectively. Areas that would be inundated by a 50-year flood, by an IRF and SPF are shown on plates. Possible solutions to bring about most feasible and economic land use of flood plain include regulatory ordinances, subdivision regulations, building codes and zoning ordinances, especially flood plain zoning. Nonregulatory techniques are acquisition of flood plain lands for green belts and parks, acquisition of flood easements, flood proofing by site filling and structural adjustments, flood insurance to reduce high losses of flood victims who must continue as residents of flood prone areas, avoiding extension of public services into flood prone areas, urban renewal and temporary and permanent evacuation from flood plains. (Salzman-North Carolina)
W75-04742

SPECIAL FLOOD HAZARD INFORMATION: CLEAR CREEK, BRAZORIA, FORT BEND, GALVESTON AND HARRIS COUNTIES, TEXAS.
Army Engineer District, Galveston, Tex.
Prepared for Harris Soil and Water Conservation District, Houston, Texas, June 1972. 13 p, 1 fig, 15 plates.

Descriptors: Floods, Flooding, *Flood plain zoning, *Planning, *Flood control, *Flood protection, Flood plains, Dams, *Texas.
Identifiers: *Clear Creek(Tex), Harris County(Tex), Intermediate Regional Flood, Standard Project Flood, Brazoria County(Tex), Fort Bend County(Tex), Galveston County(Tex).

With a total drainage area of 250 square miles, Clear Creek Watershed is 45 miles long and varies from 2 to 13 miles in width, flowing in an easterly course through wooded and grass covered terrain into Clear Lake which flows into Galveston Bay in Houston SMSA. Watershed is subject to intense local thunderstorms of short duration, general storms extending over periods of several days and to torrential rainfalls associated with tropical storms. High flood peaks are furthered by the impervious clay soil conducive to rapid runoff. Although damaging floods occurred in the area of sparse development, no floods have been recorded since 1962 when intensive development on flood plain began. Intense urbanization of the Houston SMSA has intensified the potential for flood devastation. Residential areas like Clear Lake Shore, oil tank farms, commercial and industrial areas would be greatly damaged by an Intermediate Regional Flood (IRF) or a Standard Project Flood (SPF) which would peak 1 to 2 feet higher than an IRF. Regulatory methods to reduce flood damage include: floodway encroachment limits to be established through flood plain zoning, subdivision control ordinances restricting construction to levels above selected flood levels, and building codes that establish minimum first floor elevations and flood proofing of structures. Nonregulatory techniques involve purchase of lands for open spaces and/or flood easements, flood proofing by site filling and structural adjustments, temporary and permanent evacuation of people and structures from flood plains, posting of warning signs in high flood hazard areas, and nonextension of utilities and roads by the city into the flood zone. (Salzman-North Carolina)
W75-04743

FLOOD PLAIN INFORMATION: BLUE RIVER AND TRIBUTARIES, JOHNSON COUNTY, KANSAS.
Army Engineer District, Kansas City, Mo.
Prepared for the Johnson County Commissioners and the Kansas Water Resources Board, May 1970. 38 p, 12 fig, 5 tab, 23 plates.

Descriptors: Floods, Flooding, *Flood control, *Flood protection, *Flood plains, *Flood profiles, *Kansas.
Identifiers: *Blue River(Kan), Wolf Creek(Kan), Coffee Creek(Kan), Indian Creek(Kan), Tomahawk Creek(Kan), Brush Creek(Kan), Johnson County(Kan), Intermediate Regional Flood(IRF), Standard Project Flood(SPF).

Several major streams, including Blue River, Wolf Creek, Coffee Creek, Indian Creek, Tomahawk Creek and Brush Creek compose the Blue River Basin with a total drainage area of 272 square miles. Characterized by rolling topography with steep slopes adjacent to larger streams, flood plains average 2000 to 4000 feet wide for Blue River and 1000 to 3000 feet wide for the creeks. The river bed slopes 4 feet per mile with channel varying from 50 to 70 feet wide and banks 10 to 20 feet high. Creeks have steeper slopes. Channels' widths and depths vary. Drainage patterns are well developed and no major impoundments exist. Except for intense development on Brush and Rock Creek flood plains, most of the area is rural, on the verge of total urbanization. Flood protection includes bridge improvements, channel enlargements and bank protection by stone and concrete walls. Floods generally rise rapidly and are of short duration. The greatest flood on Indian Creek was recorded on June 5, 1965 with a peak discharge of 5,250 cubic feet per second. An Intermediate Regional Flood (IRF) and Standard Project Flood (SPF) would cause extensive damage to the flood plain cresting at 14,900 cfs and 22,000 cfs respectively. A SPF would rise to its peak in about 12 hours on the average, remaining out of banks one to three days. Flood depths for various locations in Johnson County can be made by referring to plates included. (Salzman-North Carolina)
W75-04744

FLOOD PLAIN INFORMATION: NORTH FORK RIVANNA RIVER, ALBEMARLE COUNTY, VIRGINIA.
Army Engineer District, Norfolk, Va.
Prepared for the Albemarle County Board of Supervisors, March, 1973. 30 p, 5 fig, 11 tab, 15 plates.

Descriptors: Floods, *Flooding, *Flood control, *Flood protection, *Flood plain, *Virginia.
Identifiers: North Fork Rivanna River(Va), *Rivanna River(Va), Albemarle County(Va).

Located in the west central part of the county, North Fork Rivanna River receives run-off from about 176 square miles before merging with South Fork Rivanna River to form the Rivanna River, which flows for 31 miles southwardly falling about 3 feet per mile. The flood plain remains largely undeveloped being mostly pastures and woodlands. Several gaging stations on the Rivanna River supplemented by newspapers, historical documents and interviews provided data. Floods occur during all seasons resulting from intense rainfall often associated with tropical storms. The duration of flooding depends on duration of run-off producing rainfall; floods may last several days. No flood damage reduction measures exist although several are currently being studied as a part of the Corps' investigation of the entire James River Basin. The largest and most damaging flood occurred in October 1942 with intense rainfall from a hurricane lasting for 3 days. An Intermediate Regional Flood (IRF) and Standard Project Flood (SPF) would inundate the flood plain with peak discharges of 36,000 cubic feet per second (cfs) and 63,000 cfs respectively. During an IRF flood water depths may range between 30 and 40 feet in the main channel while overbank depths may average about 18 feet. Substantial damage would occur with the main channel having a possible velocity of 9 feet per second causing severe erosion. Overbank flow might reach 4 feet per second. Duration above bankfull may be as much as 31 hours for an IRF. (Salzman-North Carolina)
W75-04745

FLOOD PLAIN INFORMATION: REPORT ON THE DES PLAINES RIVER, ILLINOIS AND WISCONSIN.
Army Engineer District, Chicago, Ill.
Prepared for Northeastern Illinois Metropolitan Area Planning Commission and Southeastern Wisconsin Regional Planning Commission. March, 1966. 36 p, 20 photo, 4 tab, 18 plates, 19 ref, append.

Descriptors: Floods, Flooding, *Flood data, *Flood forecasting, *Flood plains, *Illinois, *Wisconsin, Flood control, Flow characteristics, Flood frequency, Flood recurrence interval, Maximum Probable Flood, Flood damage, Flood water.
Identifiers: *Des Plaines River(Ill-Wis), Des Plaines(Ill), Standard Project Flood(SPF), Greater Probable Flood.

Flooding of the main stem of the Des Plaines River from Riverside, Illinois to the headwaters in Racine County, Wisconsin was investigated. The Des Plaines flood plain encompasses 14,200 acres: 8,100 acres in Illinois and 6,100 acres in Wisconsin. Damage has been limited in Illinois counties by the use of flood plains as open space. In Cook County, Illinois, forest preserves cover 80% of the flood plain and in Lake County, Illinois, only 4% of the flood plain is occupied by housing. Flooding has occurred in February through April due to thawing, and damage has increased due to increased development. The major flood of record was measured in 1938 with a discharge of 5,500 cubic feet per second at Des Plaines and stage levels approached the 635.3 feet record on seven other occasions. The Greater Probable Flood (Intermediate Flood on study maps) is predicted to have a recurrence of 10 years and a discharge of 7000 cubic feet/second whereas the Standard Project Flood would have a 34,500 cubic feet/second discharge. Comparable data for other areas are given. Proposals for reducing flood damage include control of land use in the flood plain in both Illinois and Wisconsin, dredging, widening, and straightening of the channel, levee construction, reservoirs, and watershed treatment measures. (Park-North Carolina)
W75-04746

FLOOD PLAIN INFORMATION -- WILLIAMSON CREEK, AUSTIN, TEXAS.
Army Engineer District, Galveston, Tex.

Prepared for City of Austin, Texas. p 37, June, 1973. 5 tab, 6 fig, 14 plates, glossary.

Descriptors: *Flood control, *Flood damage, *Maximum probable flood, *Non-structural alternatives, Flood discharge, Flood flow, Flood peak, Flood plain zoning, Flood protection, Flooding, Floods, Erosion, Flash flood, *Texas.
Identifiers: *Flood plain management, *Williamson Creek(Tex), Austin(Tex), Standard Project Flood, Intermediate Regional Flood.

Williamson Creek, a major tributary of Onion Creek, passes Oak Hill and Pleasant Hill, Texas, just southwest of Austin. Recently six miles of Williamson Creek and its flood plain were incorporated into rapidly expanding Austin. Subdivision development is encroaching on its flood plain. Newspaper records, interviews, and studies of nearby streams indicate the Creek is subject to flash flooding -- floods of short duration with very sharp crests. A relatively steep topography funnels the region's intense spring and fall rains (up to 19.03 inches in 24 hours, recorded - 1921) and, though the resulting floods are not widespread, they have high velocities and are very destructive to all improvements in the flood path. In 1971 the Austin City Council resolved to work on flood plain management and has passed two ordinances requiring conformity to a Master Drainage Plan and initiating flood plain development criteria. This report serves as a basis for further action and encourages zoning, subdivision regulations, and an end to government encouragement of flood plain development. Data on statistically probable severe floods can be used to delineate protected areas. A Standard Project Flood would flow at 8.2 feet per second in the channel, 3.1 feet per second overbank, with a peak discharge of 31,700 cfs. Cross sections and maps are provided. (Herr-North Carolina)
W75-04747

FLOOD PLAIN INFORMATION - CEDAR BAYOU, HOUSTON METROPOLITAN AREA, TEXAS.
Army Engineer District, Galveston, Tex.
Prepared for Harris Soil and Water Conservation District, Houston, Texas, and Texas Water Development Board, Austin, Texas. June, 1972. 27 p, 6 tab, 4 fig, 28 plates, glossary.

Descriptors: *Flood forecasting, *Flood control, *Non-structural alternatives, *Surges, Floods, *Floods profiles, Peak discharge, River forecasting, Floodproofing, Flood plains, Flood data, Texas.
Identifiers: *Hurricane tidal flooding, *Cedar Bayou(Tex), Intermediate Regional Flood, Standard Project Flood, Intermediate Regional Hurricane, Stand Project Hurricane, Houston SMSA(Tex).

Baytown, Texas, extends 11 miles up the west bank of Cedar Bayou from its mouth at Galveston Bay. Cedar Bayou meanders through relatively flat forest and agricultural land but is heavily developed along its lower reaches, and unprecedented growth of this area 30 miles east of Houston is causing increased urbanization along and in the bayou's flood plain. Cedar Bayou is subject to intense rain storms and thunderstorms as well as tropical hurricanes. Its relatively flat slopes and small channel capacity produce widespread flooding which lasts for days. In 1951 Harris, Liberty, and Chambers Counties jointly contracted to widen, deepen, and partially straighten the channel, but serious flooding continues with considerable property damage. A maximum probable flood (Standard Project Flood) combined with hurricane tidal flooding in the lower 10-mile reach would produce a surge level of 18.0 feet at river mile 10 (in a Standard Project Hurricane). Maximum discharge would be 33.300 cfs with an overbank velocity of 1.2 feet per second, which would deposit considerable amounts of debris. Nonstructural alternatives ot lessen flood damage, include zoning, subdivision regulations, building codes, flood proofing of structures already built, and development policies. (Herr-North Carolina)
W75-04748

FLOOD PLAIN INFORMATION: BIG CREEK, CHETOLAH CREEK AND LINCOLN DRAW, HAYS, KANSAS.
Army Engineer District, Kansas City, Mo.
Prepared for the City of Hays, Kansas and the Kansas Water Resources Board, p 36, June 1969, 12 fig, 5 tab, 10 plates.

Descriptors: Floods, Flooding, *Flood plains, *Flood control, *Flood protection, Dams, Levees, *Kansas, Velocity conduits, Storm runoff, Conduits.
Identifiers: *Big Creek(Kan), *Chetolah Creek(Kan), *Lincoln Draw(Kan), Hays(Kan), Intermediate Regional Flood, Standard Project Flood.

Big Creek, a tributary of Smoky Hill River, and its tributaries, Lincoln Draw and Chetolah Creek pass through Hays covering 13.4 stream miles in the study area. Although much of Hays is on high ground, the flood plain contains much development. Floods are of rapid rise and short duration. Flood damage prevention measures on Big Creek include channel improvements and a levee system which tends to raise the water surface elevations behind it creating a backwater effect thereby reducing effective capacity of the levied channel. A low water dam and sewerage plant do not influence the flood situation. Lincoln Draw's drainage is affected by limited carrying capacity of conduits and a detention dam which overflows in periods of heavy rain. Trees growing in the channel also impede Lincoln Draw's flood flow. Chetolah Creek's flood plain is largely agricultural except for an Interstate Highway which detains flows. The Channel has been realigned and cleared and no damaging flood has been experienced since the flood plain has been under development. The greatest flood on Big Creek occurred June 17, 1957 with a peak discharge of 22,400 cubic feet per second. An Intermediate Regional Flood (IRF) would have peak discharges of slightly larger than the flood of June 1957. A Standard Project Flood on Big Creek would discharge 51,500 cfs, greatly exceed capacity of the levees and inundate an area much larger than that affected by an IRF. Velocities generated by all major floods will be dangerous. Overflow areas, depths of flow and contours of flooded areas can be determined from plates included in report. (Salzman-North Carolina)
W75-04749

FLOOD PLAIN INFORMATION -- GOOSE CREEK, BAYTOWN, TEXAS.
Army Engineer District, Galveston, Tex.
Prepared for: The City of Baytown, Texas. p 39, September 1973. 6 tab, 6 fig, 11 plates.

Descriptors: *Flooding, *Maximum Probable Flood, *Peak discharge, *Floods, Floodways, Flood control, Flood data, Flood discharge, Flood profiles, *Texas.
Identifiers: Intermediate Regional Flood, Standard Project Flood, Intermediate Regional Hurricane, Standard Project Hurricane, *Baytown(Tex), Goose Creek(Tex).

Baytown, Texas, located along the Houston Ship Channel where it flows into Galveston Bay 30 miles downstream from Houston, is the center of one of the world's largest oil producing areas. Goose Creek flows from north to south through Baytown into the bay. Like other Texas coastal streams, it drains low flat land; maximum relief in its 30.5 square mile basin is 43 feet above mean sea level. With the growth of Baytown due to expanding oil refineries there has been rapid encroachment on the Goose Creek flood plain. Stream gaging records from similar nearby coastal streams as well as newspaper records show that there have been 20 damaging floods in the area from 1854 to 1973 caused by severe thunderstorms or associated with tropical hurricanes, usually lasting up to two days. Baytown's 1971 flood plain ordinance is included. The city limits construction to land above the 100-year flood level and only allows properly floodproofed nonresidential structures on the flood plain. Swelled by 13 inches of rain in June, 1973, Goose Creek rose between 2 and 3 feet over its banks, destroyed Goose Creek Bridge, and did considerable damage. The computed Intermediate Regional Flood would be slightly higher. A Standard Project Flood would crest at 5.0 feet. In the lowest 5 miles of the river a Standard Project Hurricane would raise the level 19.0 feet driving water into the river from the bay. (Herr-North Carolina)
W75-04750

FLOOD PLAIN INFORMATION: SHUNGANUNGA CREEK, TOPEKA, KANSAS.
Army Engineer District, Kansas City, Mo.
Prepared for the City of Topeka, Kansas and the Kansas Water Resources Board, December 1968. 25 p, 10 fig, 6 tab, 13 plates.

Descriptors: Floods, Flooding, *Flood control, *Flood protection, *Flood profiles, *Levees, Flood plain, Dams, *Kansas, Flood flow, Velocity.
Identifiers: *Shunganunga Creek(Kan.), Topeka(Kan), Intermediate Regional Flood, Standard Project Flood.

Shunganunga Creek, a right bank tributary of the Kansas River, and its tributaries comprise the primary drainage system for the southern portion of Topeka. Development in the flood plain consists of commercial and residential structures. The stream basin has a length of 14 miles and width of 7 miles with 22.5 square miles of drainage area in this study. Topography ranges from hilly in upper reaches to flat in the lower reaches sloping at about 7.15 feet per mile. Main flooding season occurs during the summer months resulting from general heavy rain. Floods are characterized by rapid rise, high velocity and a quick return to bankfull level. Obstructions to flood flow consist of 29 bridges. Flood protection includes widening of channel, construction of a left bank levee, replacement of bridges and two detention dams. Greatest known flood occurred on April, 1945 when the Kansas River was at a high stage with a peak discharge of 8,800 cfs. Severe flooding also occurred in 1951, 1957, 1964, 1965, and 1967. An Intermediate Regional Flood (IRF) discharge would be equal to the April 1945 flood. A Standard Project Flood would be three times as great as the IRF with channel velocity reaching 15 feet per second or a little more than 10 miles per hour. Profiles of Shunganunga Creek and its tributaries are provided on plates. (Salzman-North Carolina)
W75-04751

FLOOD PLAIN INFORMATION: MECHUNK CREEK, ALBEMARLE COUNTY, VIRGINIA.
Army Engineer District, Norfolk, Va.
Prepared for the Albemarle County Board of Supervisors, November, 1973. 22 p, 12 fig, 5 tab, 12 plates.

Descriptors: *Floods, *Flooding, Flood control, Flood protection, *Flood plains, *Virginia, Flood damage, Flood profiles.
Identifiers: *Mechunk Creek(Va), Rivanna River(Va), Albemarle County(Va).

Mechunk Creek flows south from its headwaters in the Southwestern Mountains in Albemarle County and empties into the Rivanna River near Union Mills in Fluvanna County. The study covers approximately 6.5 miles of the creek which slopes at 11.4 feet per mile. The main channel which is mostly free from vegetation varies from 40 to 50 feet in the lower reach to 20 to 30 feet in the upper

reach. Adjacent flood plains vary from open farm land to heavy forest. Several small earthfill dams on tributaries have no flood control capacity. Five of the seven bridges which cross the creek would be overtopped by an Intermediate Regional Flood (IRF). There are no stream gaging stations therefore data were provided from nearby streams. Floods occur during all seasons resulting from hurricanes or intense rainfall. Concentration of floodwater can occur within 12 hours after beginning of runoff creating extreme flood heights in a short time. Duration of flooding depends on duration of run-off producing rainfall usually lasting several days. No flood damage reduction measures exist. Major flooding occurred in April 1937 and October 1942. The most recent flood was in June 1972 caused by tropical storm 'Agnes' with damage in Albemarle County estimated at $3.8 million. An IRF and Standard Project Flood would inundate farmland and bridges with peak discharges of 23,500 cubic feet per second (cfs), and 42.900 cfs. (Salzman-North Carolina)
W75-04752

FLOOD PLAIN INFORMATION--COASTAL FLOODING, CITY OF CHESAPEAKE, VIRGINIA.
Army Engineer District, Norfolk, Va.
Prepared for the City of Chesapeake, Virginia. December, 1972. 38 p, 3 tab, 6 fig, 30 plates, glossary.

Descriptors: *Flood control, Tidal waters, *Flood waves, *Surges, *Flood damage, Flood profiles, Evacuation, Flood frequency, Flood peak, Flood protection, Historic floods, Hurricanes, *Virginia, Flooding.
Identifiers: Standard Project Tidal Flood, Intermediate Regional Tidal Flood, *Chesapeake(Va), Elizabeth River(Va), Hampton Roads(Va), Northwest River(Va).

The City of Chesapeake, Virginia, covers 353 square miles and is very flat with an average elevation of only 12 feet. It contains three branches of the Elizabeth River and tidal estuaries of Hampton Roads and the Chesapeake Bay in the north. In the southeastern part of the city is the Northwest River and the Albemarle and Chesapeake Canal. These bodies of water are subject to tidal flooding into the heavy residential, industrial, and commercial development on the flood plains. Gage records on the Elizabeth River, as well as newspaper accounts, show that flooding comes in the spring with northeast storms, and from May to November with tropical hurricanes. There are no regulations of land use on the flood plain in spite of frequent flooding. In August, 1933, the deepest flood on record reached depths up to 13 feet, mean sea level. As recently as 1962 tidal flooding accompanying a northeast storm reached 7.4 feet and lasted several days. An Intermediate Regional Tidal Flood would be about a foot deeper than the 1933 flood. The maximum probable flood, a Standard Project Tidal Flood, would reach 13.0 feet, cause much damage, and isolate many areas causing extreme hazards. Data in this report will help in formulating evacuation plans and show areas which require flood plain management legislation. Complete structural protection is dismissed as unrealistic. (Herr-North Carolina)
W75-04753

FLOOD PLAIN INFORMATION: (PATUXENT RIVER) WESTERN BRANCH (FOLLY, LOTTSFORD AND VALD HILL BR.), PRINCE GEORGES COUNTY, MARYLAND.
Army Engineer District, Baltimore, Md.
Prepared for the Maryland-National Capital Park and Planning Commission. December, 1972. 33 p, 2 fig, 14 plates, 10 tab.

Descriptors: *Floods, *Flooding, *Flood data, *Flood forecasting, *Flood plains, *Flow characteristics, *Maryland, Flood control, Flood frequency, Flood recurrence interval, Maximum Probable Flood, Flood damage, Flood water.
Identifiers: *Patuxent River(Md), Prince Georges County(Md), Intermediate Regional Flood(IRF), Standard Project Flood(SPF), Bald Hill Branch(Md), Folly Branch(Md), Lottsford Branch(Md).

The Western Branch of the Patuxent River includes three tributaries: Bald Hill Branch, Folly Branch, and Lottsford Branch. The area is substantially developed and has projected further development. Continuous records of river stage and discharge 11.2 miles upstream from the mouth have been maintained by the U.S. Geological Survey. The largest known flood occurred in August, 1955 with five others of approximately the same elevation, 8.51 stage feet, occurring between 1952 and 1972. The Intermediate Regional Flood (IRF), 100 year occurrence, has a projected stage elevation of four feet higher on Western Branch than the 1955 flood while the Standard Project Flood(SPF) would average five feet higher than the IRF. Peak discharge would be 14,000 cubic feet per second at the mouth of Western Branch for an IRF compared to 33,700 cfs at the mouth of Western Branch, assuming a total rainfall of 14.2 inches in 96 hours, for a SPF. The long duration of flood and the high velocity of flow which might reach a maximum of 7-10 feet per second in the channel for an IRF could cause extensive damage in the heavily developed areas, with the 21 bridges across the Western Branch and the three tributaries which accumulate high water causing safety hazards. This report is intended as basis for future study for the highly urbanized south-central area of Maryland bordering Washington, D.C. (Park-North Carolina)
W75-04754

COMPREHENSIVE PLAN FOR WATER, SEWER AND STORM DRAINAGE IN THE LOWER RIO GRANDE VALLEY, (VOLUME II).
Nelson (B.L.) and Associates, Inc., Dallas, Tex.
For primary bibliographic entry see Field 5D.
W75-04759

NUECES RIVER PROJECT, TEXAS, PART 1.
For primary bibliographic entry see Field 6E.
W75-04786

AUTHORIZING THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN THE EAST GREENACRES UNIT, RATHDRUM PRAIRIE PROJECT, IDAHO, AND FOR OTHER PURPOSES.
Committee on Interior and Insular Affairs (U. S. House).
For primary bibliographic entry see Field 6E.
W75-04787

AUTHORIZING THE CITY OF SHERMAN, TEX., TO CONSTRUCT A BARRIER IN DENISON DAM (LAKE TEXOMA) RED RIVER, TEX. AND OKLA., FOR THE PURPOSE OF PROVIDING A MUNICIPAL AND INDUSTRIAL WATER SUPPLY.
For primary bibliographic entry see Field 6E.
W75-04789

AUTHORIZING THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN THE TOUCHET DIVISION, WALLA WALLA PROJECT, OREGON-WASHINGTON, AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 6E.
W75-04790

A SURVEY OF FEDERAL AND MISSISSIPPI ENVIRONMENTAL LAW WITH AN EXAMINATION OF ITS EFFECT ON LAND DEVELOPMENT,
Mississippi Univ., University. School of Law.
For primary bibliographic entry see Field 6G.
W75-04845

4B. Groundwater Management

THE RISING WATER TABLE IN THE WEST NUBARYA AREA OF EGYPT,
International Inst. for Land Reclamation and Improvement, Wageningen (Netherlands).
F. E. Schulze, and N. A. de Ridder.
Nature and Resources, Vol 10, No 1, January-March 1974, p 12-18, 2 fig, 1 ref.

Descriptors: *Water table, *Subsurface investigations, *Surface drainage, *Groundwater, *Seepage, Soil surveys, Pumping, Systems analysis, Irrigation, Crop production, Aquifers.
Identifiers: *Egypt.

Problems of the rising water table and accompanying salinity phenomena were studied in the Project area for the purpose of establishing a program to be carried out by the Egyptian Ministry of Reclamation. A number of subsystems with the West Nubarya area system can be isolated to study, some of which can be controlled to an extent, while others are beyond effective control. These include the climatological subsystem, the agricultural production subsystem, the groundwater subsystem, the surface-water distribution subsystem, and the artificial drainage subsystem. Some components of the recommended program requiring investigation are the groundwater characteristics of the area, including subsurface geology and hydraulic properties of aquifers and confining layers; surface water hydrology, including inflow, outflow, and seepage; consumptive uses and deep percolation losses using lysimeter measurements; and water application techniques on a practical scale to be conducted in conjunction with consumptive use and deep percolation loss investigations. (Mastic-Arizona)
W75-04363

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES.
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04402

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 4: GEOLOGIC DISPOSAL.
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04404

GEOTHERMAL WELLS IN IMPERIAL VALLEY, CALIFORNIA: DESALTING POTENTIALS, HISTORICAL DEVELOPMENT, AND A SELECTED BIBLIOGRAPHY,
For primary bibliographic entry see Field 3A.
W75-04423

UTILIZATION OF THE EARTH'S NATURAL HEATING SYSTEM TO DESALT GEOTHERMAL BRINES FOR AUGMENTATION OF THE COLORADO RIVER SYSTEM,
Bureau of Reclamation, Boulder City, Nev. Region 3.
For primary bibliographic entry see Field 3A.
W75-04430

RADIOCARBON, CARBON-13 AND TRITIUM IN WATER SAMPLES FROM BASALTIC AQUIFERS AND CARBONATE AQUIFERS ON THE ISLAND OF OAHU, HAWAII,
Hawaii Inst. of Geophysics, Honolulu.
For primary bibliographic entry see Field 2F.
W75-04441

NITROGEN MASS BALANCE DETERMINATION FOR SIMULATED WASTEWATER LAND-SPREADING OPERATIONS,
Texas Tech Univ., Lubbock. Water Resources Center.
For primary bibliographic entry see Field 5D.
W75-04449

MORE WATER FOR ARID LANDS, PROMISING TECHNOLOGIES AND RESEARCH OPPORTUNITIES.
Ad Hoc panel of the Advisory Committee on Technology Innovation, Board on Science and Technology for International Development, Commission on International Relations.
For primary bibliographic entry see Field 3B.
W75-04508

PARAMETER IDENTIFICATION IN DISTRIBUTED SYSTEMS USING A DIGITAL SIMULATION LANGUAGE: AN EXTENSION OF PDEL,
California Univ., Los Angeles.
For primary bibliographic entry see Field 6A.
W75-04540

REDUCING FEEDLOT NITRATES IN YOUR GROUND WATER,
For primary bibliographic entry see Field 5B.
W75-04547

ORGANIC COMPOUNDS ENTERING GROUND WATER FROM A LANDFILL,
Oklahoma Univ., Norman. School of Civil Engineering and Environmental Science.
For primary bibliographic entry see Field 5B.
W75-04573

EPA POLICY ON INJECTION WELLS.
For primary bibliographic entry see Field 5G.
W75-04592

FACTORS AFFECTING THE ESTIMATE OF AREAL AVERAGE SUMMER AND WINTER PRECIPITATION IN A SMALL CATCHMENT OF THE SWISS PREALPS,
Swiss Forest Research Inst., Birmensdorf.
For primary bibliographic entry see Field 2B.
W75-04686

GROUNDWATER PUMPAGE IN NORTHERN ILLINOIS, 1960-1970,
Illinois State Water Survey, Urbana.
R. T. Sasman, C. R. Benson, G. L. Dzurisin, and N. E. Risk.
Available from the National Technical Informatiop 46, n Service, Springfield, Va. 22161, as PB-239 695, $3.75 in paper copy, $2.25 in microfiche. Report of Investigation 73, p 46, 1974. 27 fig, 13 tab, 16 ref.

Descriptors: *Groundwater, Surface waters, *Pumping, *Illinois, Sand aquifers, *Aquifers, Gravels, Sandstones, Dolomite, Water users, Water utilization, Groundwater resources, *Water supply, Conjunctive use.

Large supplies of groundwater are developed from three aquifer systems in northern Illinois for public, industrial, and domestic uses. Sand and gravel and shallow dolomite aquifers are generally encountered at depths less than 500 feet; the depth of sandstone aquifers generally exceeds 500 feet. Pumpage increased from 303.08 mgd in 1960 to 424.30 mgd in 1970. Of the total 1970 pumpage, 61% was for public supplies, serving 274 municipalities, 248 subdivisions, and 308 institutions; 971 industries pumped 25% of the total pumpage. Cook County pumped considerably more groundwater than any other county, nearly 24% of the 1970 total. Other major withdrawals of groundwater are in Du Page, Kane, Will, and Winnebago Counties. In addition to groundwater pumpage, 1112.25 mgd was pumped from Lake Michigan for public supplies in 1970. An additional 29.42 mgd surface water pumpage for public suplies was pumped from the Kankakee, Mississippi, and Vermilion Rivers. Data were provided for planning growth of groundwater pumpage in this area. (Dawes-ISWS)
W75-04727

NUTRIENT ENRICHMENT OF GROUNDWATER FROM SEPTIC TANK DISPOSAL SYSTEMS,
Wisconsion Univ., Madison. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 5C.
W75-04758

SUBSURFACE SEWAGE DISPOSAL AND CONTAMINATION OF GROUND WATER IN EAST PORTLAND, OREGON,
Oregon State of Environmental Quality, Portland. Water Quality Div.
For primary bibliographic entry see Field 5B.
W75-04798

SAMPLING OF VARIABLE, WASTE-MIGRATION PATTERNS IN GROUND WATER,
Michigan State Geological Survey, Lansing.
For primary bibliographic entry see Field 5B.
W75-04799

WILL CURRENT RESEARCH ANSWER TODAY'S PROBLEMS AT THE SANITARY LANDFILL.,
Auburn Univ., Ala. Water Resources Research Inst.
For primary bibliographic entry see Field 5B.
W75-04800

4C. Effects On Water Of Man's Non-Water Activities

CORRELATION OF HYDROLOGIC MODEL PARAMETERS WITH CHANGING LAND USE AS DETERMINED FROM AERIAL PHOTOGRAPHS,
Clemson Univ., S. C. Dept. of AGgricultural Engineering.
J. T. Ligon, and D. B. Stafford.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 239 407, $4.75 paper copy, $2.25 microfiche. South Carolina Water Resources Research Institute, Clemson, Report No 50, December 1974. 75 p, 16 fig, 10 tab, 9 ref, 2 append. OWRT A-024-SC (5).

Descriptors: *Land use, *Urbanization, Hydrology, *Simulation analysis, *Streamflow, Aerial photography, *South Carolina, *Model studies, Computer programs, Watersheds(basins), Watershed management.
Identifiers: *Reedy River(SC), *North Tyger River(SC), Piedmont region(SC), Stanford watershed model.

Results are described of a research project in which the effects of progressive land use changes in watersheds on the hydrologic response of the water sheds were investigated. The study examined two watersheds in the Piedmont Region of South Carolina. The North Tyger River near Spartanburg was selected for study because it was believed to be typical of watersheds which have experienced significant changes in agricultural land use practices. The Reedy River near Greenville was selected as being typical of watersheds in which rural land is being converted rapidly to urban land use. The distribution of land use in each watershed was determined at six intervals over the past 30 years from measurements on aerial photographs. A computer program for the Kentucky version of the Stanford Watershed Model was used to simulate streamflow in the two watersheds. A comparison of simulated and recorded streamflow was used to optimize model parameters so that reasonable agreement between simulated and recorded streamflow was obtained. Correlation of the optimized model parameters and watershed land use was the technique used to examine the relationship between watershed hydrologic response and land use changes. The watershed model parameter, basic maximum infiltration rate, was found to increase significantly with the percentage of the watershed in forest and pasture and to decrease significantly with the percentage of the watershed which consisted of impervious area and residential area. The other three watershed model parameters studied were not significantly correlated with watershed land use.
W75-04448

INADVERTENT RAIN MODIFICATION AS INDICATED BY SURFACE RAINCELLS,
Illinois State Water Survey, Urbana.
For primary bibliographic entry see Field 2B.
W75-04703

DEVELOPMENT OF GUIDELINES FOR THE DESIGN OF SUBSURFACE DRAINAGE SYSTEMS FOR HIGHWAY PAVEMENT STRUCTURAL SECTIONS,
Cedergren/KOA, Long Beach, Calif.
For primary bibliographic entry see Field 8A.
W75-04809

4D. Watershed Protection

AN ANALYSIS OF FOREST WATER PROBLEMS IN GEORGIA,
Georgia Univ., Athens. School of Forest Resources.
J. D. Hewlett.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 350, $3.75 in paper copy, $2.25 in microfiche. Georgia Forest Research Council Report No 30, August 1972. 27 p, 4 fig, 2 tab, append. OWRT A-022-GA(1).

Descriptors: *Water resources, *Forests, *Georgia, Hydrology, Forest management, Watershed management.
Identifiers: *Forest hydrology.

The influences of the forests of Georgia on water flows, erosion and flooding are discussed. The impact of man's various management activities on soil and water resources begins in this complex segment of the hydrologic cycle. The water resources of the State are summarized in terms of the adequacy or inadequacy of the supply or availability by the six major geologic provinces. The overall pattern shows that the Lower Coastal Plain is abundantly endowed with water and water-related resources, while the Ridge and Valley region is in rather short supply. The forest may be used largely to moderate the ecological and hydrological impacts of continued urbanization and industrialization of the Piedmont, and its role in this respect may eventually exceed that of timber supply. Forestry has a greater stake in the Lower Coastal Plain than in any other part of Georgia. About 30% of the total, or 1.5 million acres, is in bays, swamps, ponds, and marshes which the forest managers believe could be greatly improved for timber production by surface drainage. Beach erosion by wind and wave on the outer islands is serious enough to warrant attention from foresters. In developing the multiple use of forest, hydrologic research and trained forest watershed managers will play a key role. (See also W75-04357 and W75-04358) (Knapp-USGS)
W75-04356

STUDY OF SUBSURFACE FLOW INTO MOUNTAIN STREAMS AS RELATED TO TOPOGRAPHY AND PARTIAL (VARIABLE) SOURCE AREAS,
Georgia Univ., Athens. School of Forest Resources.
J. D. Hewlett.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 351, $3.25 in paper copy, $2.25 in microfiche. Termination Report, December 1972. 5 p, 4 ref. OWRT A-022-GA(1).

Descriptors: Hydrology, *Small watersheds, Base flow, Hydrographs, Groundwater, *Storm runoff, *Demonstration watersheds, *Water sources, *Model studies, Watersheds(Basin).

Results are summarized of a series of studies designed to model the mechanism by which rainfall and snowmelt become streamflow in headwater areas, particularly on forests, ranges and wildlands. The study was intended to further develop the concept of a variable source area of streamflow and a model. The report describes the contributions of the research to the IHD program and cites scientific publications resulting from the research. (See also W75-04356 and W75-04358)
W75-04357

THE VARYING SOURCE AREA OF STREAMFLOW FROM UPLAND BASINS,
Georgia Univ., Athens. School of Forest Resources.
J. D. Hewlett, and W. L. Nutter.
Available from the American Society of Civil Engeneering, 345 E. 47th Street, New York, NY, $6.00 in paper copy, $2.25 in microfiche. In: Proceedings of the Symposium on Interdisciplinary Aspects of Watershed Management, Montana State University, Bozeman, Montana, August 3-6, 1970, p 65-83. 10 fig, 14 ref. OWRT A-022-GA(1).

Descriptors: *Subsurface runoff, Overland flow, *Small watersheds, Base flow, Groundwater, *Water sources, *Demonstration watersheds, *Model studies, *Storm runoff, Watersheds(Basins).

To counteract continued insistence by some hydrologists that subsurface stormflow cannot contribute substantially to the storm hydrographs, the variable source area concept is reviewed and hydrograph data from various parts of the world are assembled to prove that subsurface stormflow is both a general and a major hydrologic phenomenon. In addition, subsurface stormflow hydrographs from a large (200 x 8 x 4 feet) watershed segment model are explained in relation to actual watershed discharge under the same storm rainfall. A conceptual model for the first order stream hydrograph is proposed to define hydrologic terms and to serve as a physically valid core model for hydrograph simulation programs. The conceptual model is not yet operational. (See also W75-04356 and W75-04357.)
W75-04358

REGULATION OF URBAN DEVELOPMENT TO CONTROL RUNOFF AND EROSION,
Pennsylvania Univ., Philadelphia. Inst. for Environmental Studies.
A. L. Strong.
July, 1972, revised September, 1972. 26 p, 1 fig.

Descriptors: *Delaware River Basin Commission, *Legal aspects, *Erosion control, *Local governments, *Watershed management, *Water management(Applied), Planning, Water pollution control, *Water law, *Regulation, Delaware, New York New Jersey, Pennsylvania, Water zoning, Water resources, Institutional constraints, Government, Law enforcement, Management, Constraints, Permits, Water permits, Public rights, Public access, River regulation, Flood plain zoning, *Runoff, Runoff forecasting, *City planning, *Urbanization, Surface-groundwater relationships.
Identifiers: Runoff and erosion control ordinances, *Ordinances, Subdivision regulations.

Since relationships between development and increased runoff are known, it is possible to design permanent runoff management programs to control the rate and amount of runoff discharged into streams. Through adequate planning prior to development and effective enforcement programs during and after development, public costs from erosion, sedimentation, and flooding can be averted. A runoff and erosion control ordinance is proposed for use in the Tri-County region of Delaware River basin, and it should be incorporated by local governments as an amendment to subdivision ordinances or as an independent ordinance. The Delaware River Basin Commission (DRBC) reviews projects whose effects are on water resources, so almost all local subdivision projects are outside of the Commission's review power. This proposed ordinance stipulates permits, inspection, protection of adjacent properties, maintenance of runoff and erosion control measures, penalties, exemptions, and other general provisions. The ordinance states objectives and established procedures for enforcement, but leaves detailed specifications for protection measures to the Soil and Water Conservation Districts. It therefore should serve as a starting point for local governments when developing an ordinance appropriate for their needs and circumstances. (Grden-North Carolina)
W75-04362

DIFFERENCES BETWEEN PLANNED AND ACTUAL COSTS AND BENEFITS IN SMALL WATERSHED DEVELOPMENT,
Economic Research Service, East Lansing, Mich. Natural Resource Economics Div.
J. D. Sutton.
Soil and Water Conservation, Vol 29, No 4, p 165-168, July/August, 1974. 4 tab, 4 ref.

Descriptors: *Small watersheds, *Water resources development, *Watershed management, *Projects planning, Environmental effects, Cost-benefit analysis, Cost-benefit ratio, River basin development, *Costs, *Benefits.

Water resource planners design projects on the basis of future benefits; the discounted future benefits must exceed the economic costs. The difficulty in planning is that many of the costs and benefits do not become apparent until several years after planning, therefore the variables that relate to the costs and benefits must be projected. Evaluations of projects several years after they have been in operation allow an analysis of the planning process and supplies a way to perfect future planning. Four completed small watershed projects that had operated for four to five years were evaluated by qualitatively comparing current values of primary costs and benefits with planners' estimates and identifying reasons for devergences between planned and achieved values. The results indicated that planners should encourage local involvement in planning; analyze socioeconomic trends at the project and river basin levels; and, use a multiobjective planning approach to reduce the difference between the planned estimates and the actual values. The projects were largely considered to have no effect on the environment. Beauty of the area involved was most often considered improved. In areas where the natural streams were channeled negative responses were received for the effects on hunting, fishing, and wildlife cover. (Orr-FIRL)
W75-04433

THE DISTRIBUTION OF PRECIPITATION IN SOME MOUNTAINOUS CANADIAN WATERSHEDS,
Atmospheric Environment Service, Calgary (Alberta).
For primary bibliographic entry see Field 2B.
W75-04671

SOIL EROSION AND SEDIMENT TRANSPORT FROM GULLIES,
Agricultural Research Service, Columbia, Watershed Research Unit.
For primary bibliographic entry see Field 2J.
W75-04707

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

IDENTIFICATION AND EVALUATION OF WATER TRACERS AMENABLE TO POST-SAMPLING NEUTRON ACTIVATION ANALYSIS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
W. A. Jester, and K. A. Uhler.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 348, $4.75 in paper copy, $2.25 in microfiche. Research Publication Number 85, September 1974. 92 p, 16 fig, 5 tab, 10 ref, 2 append. OWRT A-026-PA(4).

Descriptors: *Neutron activation analysis, *Analytical techniques, *Chemical analysis, *Acidic waters, Hydrogen ion concentration, Ions, *Pollutant identification, Halogens, Chlorine, Iodides, Cobalt, Bromides, *Tracers.
Identifiers: *Tracer techniques, Short irradiation, Vanadium, Cobaltous ions, Chlorine ions, Iodide ions, Bromide ions.

The halogen ions Br-, I-, and Cl- appear to be suitable water tracers for use in waters having a pH range between pH 5 and pH 8 with neutron activation analysis. The bromide and iodide ions can experience very great dilutions and still be detected above normal background concentrations. Chlorides are limited because of the normally substantial natural backgrounds which, in the 27 samples analyzed, range from 1.3 mg/l to 62 mg/l. When using several tracers in one program the chlorides should be injected closest to the sampling point because of the dilution factor limitation. Sensitivities and detection limits are variable and depend upon background concentrations and maximum allowable tracer concentrations. In very acid waters the vanadium and cobaltous ions appear to offer promise, with the divalent cation of vanadium offering the greater sensitivity of the two. Bromides and chlorides appear to be reliable in this pH range with the same limits of detection as at more neutral pH values. Successful application of these tracer techniques is strongly dependent on analysis of the carrier water to determine background concentrations of the tracers. These analyses must be made using activation analysis, since wet chemical analyses do not provide sufficient sensitivity. (Sink-Penn State)
W75-04355

SUPERSONIC AIRCRAFT AND THE OZONE LAYER,
California Univ., Berkeley. Lawrence Berkeley Lab.
H. S. Johnston.
Available from NTIS, Springfield, Va 22161 as Rept. No. LBL-2748, $5.45 in paper copy, $2.25 in microfiche. Report No. LBL-2478, May 1974. 52 p, 15 fig, 3 tab, 29 ref. AEC W-7405-ENG-48.

Descriptors: *Ozone, *Oxygen, *Nitrogen, Movement, Nitrogen compounds, Oxides, Aircraft, Solar radiation, *Model studies, *Air pollution, *Pollutant identification, Path of pollutants, Air pollution effects, Atmosphere.
Identifiers: *Photochemistry, *Stratosphere.

Model calculations including atmospheric motions and the photochemistry of oxygen, water, and

nitrogen oxides indicate that 500 supersonic transports would reduce the stratospheric ozone shield between 3 and 30 percent. Stratospheric ozone has been observed to change with solar-cycle modulated cosmic rays, presumably by virtue of the nitric oxide produced. The ozone data of 1960-70 are consistent with a small decrease and then increase of ozone associated with nitric oxide from nuclear-bomb tests. These observed changes of ozone with nitric oxide indicate a greater sensitivity of stratospheric ozone to nitric oxide than is given by most model calculations. (Houser-ORNL)
W75-04393

METHOD FOR THE CONSTRUCTION OF THREE-DIMENSIONAL ELECTRON MICROGRAPHS,
California Univ., Livermore. Lawrence Livermore Lab.
R. J. Grabske.
Available from NTIS, Springfield, Va 22161 as No. UCRL-51611, $4.00 in paper copy, $2.25 in microfiche. Report No. UCRL-51611, Sept. 10, 1964. 6 p, 3 fig, 1 ref.

Descriptors: Digital computers, Research and development, Dimensions, Shape, Size, Photography, Molds, Plastics, Polymers, Heat, *Pollutant identification, *Instrumentation, Measurement, Fabrication, *Electron microscopy.
Identifiers: *Micrographs(Three dimensional).

A method is described for the construction of three-dimensional pictures from the computer output of the polytropic montage process for three-dimensional representation in electron microscopy. The final computer output is a series of two-dimensional images on photographic film, each of which corresponds to one increment in the third dimension. These film positives (dark images on light background) are stacked alternately with U-shaped spacer bars, with aluminum backing plates top and bottom. The entire assembly is bolted together firmly to form a mold. The mold is subsequently filled with a transparent plastic monomer and polymerized by heat. (Houser-ORNL)
W75-04394

PACIFIC NORTHWEST LABORATORY ANNUAL REPORT FOR 1973 TO THE USAEC DIVISION OF BIOMEDICAL AND ENVIRONMENTAL RESEARCH PART 4. PHYSICAL AND ANALYTICAL SCIENCES,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5C.
W75-04410

RADIATION INSTRUMENTATION - RADIOLOGICAL CHEMISTRY,
Battelle-Pacific Northwest Labs., Richland, Wash.
N. A. Wogman, R. L. Brodzinski, L. A. Rancitelli, J. R. Kosorok, and C. W. Thomas.
In: Report No BNWL-1850, Part 4, p 1-26, Feb. 1974. 5 fig, 4 tab, 6 ref.

Descriptors: *Pollutant identification, *Environment, *Sampling, *Measurement, *Analytical techniques, *Research and development, *Instrument, Radiochemical analysis, Radioecology, Technology, Movement, Transport, Tracers, Radioactive tracers, Absorption.

This program provides the development of radiochemical instrumentation and analytical technology required for analysis of biomedical and environmental samples and their application in (a) research studies to characterize the inventories and the routes and rates of transport of natural, tracer or waste radionuclides in environmental systems, (b) comparison of radioelement and stable element counterpart behavior in the environment, and (c) the study of physical and chemical transformations which occur and affect the transport and uptake processes. The development of this program provides the instrument technology and the pilot environmental studies needed to delineate advanced research program needs of the Division of Biomedical and Environmental Research. (See also W75-04410) (Houser-ORNL)
W75-04411

NUCLEAR TECHNIQUES IN MEDICAL SCIENCE,
Battelle-Pacific Northwest Labs., Richland, Wash.
H. E. Palmer, L. A. Braby, T. K. Lewellan, W. P. Nelp, and G. M. Hinn.
In: Report BNWL-1850-Part 4, p 27-39, February 1974. 5 fig, 1 tab, 6 ref.

Descriptors: *Pollutant identification, *Research and development, *Nuclear energy, Technology, *Biology, *Instrumentation, *Beneficial use, Public benefits, Public health, Environment, Measurement, Plutonium.
Identifiers: Alpha emitters.

The purpose is to perform research in the application of nuclear technology and radioisotopes to medicine and biology by combining the advanced knowledge, techniques, and instrumentation of the nuclear field with the talent and knowledge of the medical profession to improve and to increase the direct medical benefits to mankind. Advanced instrumentation concepts, detectors, and circuitry are also being developed for use in health physics environmental studies, particularly in measuring in vivo plutonium and other alpha emitters. These studies usually culminate in a cooperative effort with a medical institution for their practical application. (See also W75-04410) (Houser-ORNL)
W75-04412

RADIATION PHYSICS,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5C.
W75-04413

RADIATION DOSIMETRY,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5C.
W75-04414

RADIATION BIOPHYSICS,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5C.
W75-04415

NUCLEAR POWERED PROSTHESES - BIOLOGICAL EFFECTS OF INTRA-CORPOREAL RADIOISOTOPE HEAT SOURCES,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5C.
W75-04416

MEDICAL USES OF ISOTOPES,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5C.
W75-04417

MEDICAL GRADE PLUTONIUM-238 FROM AMERICIUM-241,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5C.
W75-04418

DEVELOPMENT OF AN AIR POLLUTION MODEL FOR THE SAN FRANCISCO BAY AREA. THIRD SEMI ANNUAL REPORT TO THE NATIONAL SCIENCE FOUNDATION.
California Univ., Livermore. Lawrence Livermore Lab.
Available from NTIS Springfield, Va., 22161 as Rept. No UCRL-51660, $4.00 paper copy, $2.25 microfiche. Report No UCRL-51660, Sept. 23, 1974. 12 p, 1 tab, 3 ref.

Descriptors: *Research and Development, *Air pollution, *Control, *Model studies, Management, Bays, Operations, Census, *California, Path of pollutants, Pollutant identification.
Identifiers: *San Francisco Bay, Photochemistry.

An interagency effort is underway at the University of California Lawrence Livermore Laboratory (LLL), the NASA-Ames Research Center (ARC) and the Bay Area Air Pollution Control District (BAAPCD) to develop and validate a regional air pollution model which can be applied to the air quality problems facing the San Francisco Bay Area. Previous Semi-annual Reports (UCID-16301, July 9, 1973; UCRL-51537, February 27, 1974) reported on the organization of the development project, progress made, and plans for the remaining time. The planned research activities were divided into five major subtasks, and a joint working group was established for each -- Operational Planning, Source Inventory, Photochemistry, Model Development and Validation, and Model Applications. (Houser-ORNL)
W75-04421

INSTRUMENTATION IMPROVES WATER TREATMENT PLANT OPERATION,
For primary bibliographic entry see Field 5F.
W75-04434

TORULOPSIS AUSTROMARINA SP. NOV. A YEAST ISOLATED FROM THE ANTARTIC OCEAN,
Rosenstiel School of Marine and Atmospheric Science, Miami, Fla.
J. Fell, and I. Hunter.
Antonie van Leeuwenhoek, Vol 40, No 2, p 307-310, 1974. 8 ref.

Descriptors: *Yeasts, *Antarctic Ocean, Water pollution sources, Water pollution, Pollutants, Water quality, *Pollutant identification.
Identifiers: *Troulopsis austromarina, New species.

A new species of yeast, Torulopsis austromarina, has been found in the oceanic waters of the Indo-Pacific and Indian Ocean parts of the Antartic. T. austromarina is related to T. inconspicua but T. inconspicua can not assimilate galactose, trehalose, inulin or soluble starch and has a higher maximum temperature. (Orr-FIRL)
W75-04436

RADIOCARBON, CARBON-13 AND TRITIUM IN WATER SAMPLES FROM BASALTIC AQUIFERS AND CARBONATE AQUIFERS ON THE ISLAND OF OAHU, HAWAII,
Hawaii Inst. of Geophysics, Honolulu.
For primary bibliographic entry see Field 2F.
W75-04441

DEPOSITION OF WATER AND CATIONS ON ARTIFICIAL FOLIAR COLLECTORS IN FIR KRUMMHOLZ OF NEW ENGLAND MOUNTAINS,
Cornell Univ., Ithaca, N.Y. Dept. of Ecology and Systematics.
For primary bibliographic entry see Field 2K.
W75-04471

FLUORIDE CONCENTRATIONS IN TWO PACIFIC COAST INLETS-AN INDICATION OF INDUSTRIAL CONTAMINATION,
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
For primary bibliographic entry see Field 5B.
W75-04473

PETROLEUM HYDROCARBONS IN NARRAGANSETT BAY: I. SURVEY OF HYDROCARBONS IN SEDIMENTS AND CLAMS (MERCENARIA MERCENARIA),
Woods Hole Oceanographic Institution, Mass. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W75-04477

PETROLEUM HYDROCARBONS IN NARRAGANSETT BAY: II. CHEMICAL AND ISOTOPIC ANALYSIS,
Woods Hole Oceanographic Institution, Mass. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W75-04478

CONTACT (OIL) WATER DETERMINATION IN TERRESTRIAL-WATERS USING AN OCEANOGRAPHIC METHOD,
Institut za Oceanografiju i Ribarstvo, Split (Yugoslavia).
M. Buljan.
Acta Adriat, Vol 15, No 4, p 1-19, 1974, Illus.
Identifiers: *Contact water(Oil), Methodology, *Oceanographic methods, *Oil pollution, Terrestrial waters, *Pollutant identification, Sulfate balance.

A method is described making it possible to determine contact waters (water containing natural petroleum) among natural waters of all types. Two new properties have to be found: the sulfate balance (SB), (equal to the loss of sulphate during the diagenesis of the water) and the index of aeration (IA). Data from various countries including Rumania, Yugoslavia and the near east are given indicating a strong correlation between the negative values of SB and the occurrence of oil in the layers from which water samples were taken. A similar correlation is found for the IA of water and the oil occurrence in the strata. The SB and the IA show the recent formation of contact water in the Sea sediments. The method can sometimes give information prior to boring for oil which concerns the content of oil in the strata. The methods of finding the values of the 2 new parameters are also given.--Copyright 1974, Biological Abstracts, Inc.
W75-04502

SOLUTION OF SIMULTANEOUS PARTIAL DIFFERENTIAL EQUATIONS: AN EXTENSION OF PDEL,
California Univ., Los Angeles.
For primary bibliographic entry see Field 6A.
W75-04539

ORGANIC COMPOUNDS ENTERING GROUND WATER FROM A LANDFILL,
Oklahoma Univ., Norman. School of Civil Engineering and Environmental Science.
For primary bibliographic entry see Field 5B.
W75-04573

ENTEROBACTERIA IN FEEDLOT WASTE AND RUNOFF,
Agricultural Research Service, Peoria, Ill. Northern Marketing and Nutrition Research Div.
G. R. Hrubant, R. V. Daugherty, and R. A. Rhodes.
Applied Microbiology, Vol 24, No 3, p 378-383, September, 1972. 6 tab, 12 ref.
Descriptors: *Feed lots, *Farm wastes, Runoff, Waste disposal, Recycling, Sampling, Microorganisms, Cattle, Pollutant identification, Water pollution sources, Public health.
Identifiers: *Enterobacteria, Refeeding, Health hazards.

Refeeding of wastes is currently being investigated as a possible means of combating vast accumulations of waste from animal production. However, little attention has been given the possible microbiological aspects of feedlot waste. This study was done to determine the types of microflora found in feedlot waste and associated sites. Samples were taken from feedlot waste, runoff from the pens, and water from a large drainage ditch at the feedlot, and they were examined for Enterobacteriaceae. Five-hundred and fifty-three cultures were isolated. Feedlot waste contains about 50,000,000 enterobacteria per gram. More than 90% of these were Escherichia coli. Enrichment techniques allowed isolation of four Proteus spp., both Providencia spp., Klebsiella, Enterobacter aerogenes, Arizona, and single isolate of Salmonella. Neither Arizona nor Salmonella were isolated from the drainage ditch or runoff. Results indicate that the refeeding of unsterilized feedlot waste is potentially hazardous due to the wide spectrum of enterobacteria found in these wastes. (Russell-East Central)
W75-04633

SUBFLOOR MONITORING OF SHADY GROVE DAIRY LIQUID MANURE HOLDING POND,
San Bernadino County Agricultural Extension Service, Calif.
For primary bibliographic entry see Field 5D.
W75-04640

A LEAK-PROOF SAMPLING PORT IN GAS ANALYSES STUDIES,
Guelph Univ., (Ontario). Dept. of Land Resource Science.
For primary bibliographic entry see Field 7B.
W75-04697

MEASUREMENT OF HYDROCARBONS IN WATER: APPLICATION TO CASES OF SURFACE WATER POLLUTION,
Societe Lyonnaise des Eaux et de l'Eclairage (France). Laboratoire.
J. Mallevialle.
Water Research, Vol 8, No 12, p 1071-1075, 1974. 4 fig, 2 tab, 11 ref.

Descriptors: *Analytical techniques, *Fuels, *Oil wastes, *Organic compounds, *Water analysis, Solvent extraction, Chemical analysis, Water pollution, Separation techniques, Analysis, Water pollution sources, Measurement, Estimating, Instrumentation, Oil, Gasoline, Oil pollution, Water pollution, Spectroscopy, *Pollutant identification.
Identifiers: *Carbon tetrachloride extraction, Florisil.

An analytical method for the determination of hydrocarbons in water by carbon tetrachloride extraction and infrared measurement of absorption was presented. It was found that 0.1 mg/l of hydrocarbons in water can be measured by extraction with carbon tetrachloride, florisil chromatography, and measurement of absorption over the 3000-2800/cm infrared range. While most interference is eliminated by chromatography, the method is unsuitable for aromatic hydrocarbons. Because of its relatively high sensitivity and particularly because of its rapidity and simplicity, the method is highly competitive with other methods, including gaseous phase chromatography. (Henley-ISWS)
W75-04709

CHEMICAL AND PHYSICAL CHARACTERIZATION OF TAR SAMPLES FROM THE MARINE ENVIRONMENT,
Shell Development Company, Houston, Tex. Bellaire Research Center.
P. R. Mommessin, and J. C. Raia.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-787 788, $7.25 in paper copy, $2.25 in microfiche. Report No CG-D-20-75, p 240, June 1974. 2 fig, 7 tab, 8 ref, 6 append. DOT-CG-23,379-A.

Descriptors: *Waste identification, *Water pollution, *Oceans, *Pollutant identification, Analytical techniques, Chemical properties, Physical properties, Wastes, Water pollution sources, Mass spectrometry, Spectroscopy, Microscopy, Palynology, Sulfur.
Identifiers: Carbon isotope ratio, Tar samples.

A physical and chemical characterization of tar samples recovered from the marine environment was carried out. The task included the measurement of 32 physical and chemical parameters, photography, and microscopic analysis of each sample. Two distinct types of tar samples were indicated. One type appears to be urban and industrial waste products. The other includes petroleum-based materials which have been modified in varying degrees by weathering processes operating in the marine environment. This type included materials which were relatively high in sulfur and might originate from the sulfur-rich crudes known to be transported in the vicinity of their collection. Many of the petroleum-based samples contained substantial paraffinic material with a volatility distribution characteristic of that reported for materials found in discharge from tankers during tank cleaning operations. Particularly distinctive results were obtained from the volatility distribution. Other parameters such as sulfur content, carbon isotope ratios, pristane/phytane ratio, mass spectral analyses, and, to some extent, infrared analyses were also productive. The appendixes contain a description of analytical methods, many photographs and photomicrographs, results of a palynological study, and tables, charts, and analyses describing the analytical results. (Sims-ISWS)
W75-04718

DETERMINATION OF THE MOLECULAR SOLUBILITY OF NAVY OILS IN WATER,
Naval Ordnance Lab., White Oak, Md.
M. G. Lai, and C. E. Adams.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-784 414, $3.75 in paper copy, $2.25 in microfiche. Report No NOLTR 74-110, p 21, June 1974. 4 fig, 6 tab, 5 ref.

Descriptors: *Solubility, *Osmosis, *Oil pollution, Oil, Organic compounds, Aqueous solutions, Membrane processes, Separation techniques, Methodology, Measurement, Pollutant identification, Water pollution sources.
Identifiers: Dispersed oil.

A method for the determination of true molecular solubility of hydrocarbons in water was developed. The method, based on the principle of osmotic pressure, was capable of measuring true soluble hydrocarbon concentration in the presence of dispersed hydrocarbon in water. The method was applied to the determination of the molecular solubility of Navy oils in water. The solubility was found to be dependent on the water-to-oil ratio, and the rate of dissolution was a function of agitation of the water-oil mixture. (Sims-ISWS)
W75-04722

DETERMINATION OF THE THICKNESS OF PETROLEUM FILMS ON WATER,
Naval Research Lab., Washington, D.C. Ocean Sciences Div.
W. R. Barger, D. R. Sherard, and W. D. Garrett.

Available from the National Technical Information Service, Springfield, Va. 22161, as AD-786 353, $3.25 in paper copy, $2.25 in microfiche. NRL Memorandum Report 2883, p 15, August 1974. 4 fig, 5 tab, 10 ref.

Descriptors: *Oil spills, *Sampling, Liquid wastes, Surfaces, *Oil pollution, *Pollutant identification.
Identifiers: *Oil-layer thickness, Polyurethane foam, Hydrophilic teflon.

Two uncomplicated devices were developed to determine the thickness of petroleum films on water. Both techniques use oil collectors which quantitatively remove the oil layer from a known surface area. The devices are weighed before and after being placed on the oil-covered water, and a small correction factor for entrained water is applied to the calculation of oil layer thickness. Reticulated, polyurethane foam discs are mounted in an open-ended cylinder to form a floating oleophilic sponge. When placed on the water, oil is absorbed within the confined cylindrical area. For thicknesses of Navy distillate fuel oil between 0.25 and 20 mm, the accuracy of the floating absorber is plus or minus -4.8%, and for No. 5 fuel oil thicknesses between 0.5 and 6 mm, accuracy is plus or minus 7.9%. The second collector, a hydrophilic Teflon sheet, removes thin layers of oil from water upon contact. Satisfactory oil layer thickness results are obtained between 65 and 300 micrometers for heavy oils. For lighter oils, the hydrophilic sheet method is valid only between 30 and 85 micrometers. However, because of its chemically inert character, the hydrophilic Teflon collector is useful for sampling spills for chemical identification and analyses. (Sims-ISWS)
W75-04723

SUBSURFACE SEWAGE DISPOSAL AND CONTAMINATION OF GROUND WATER IN EAST PORTLAND, OREGON,
Oregon State of Environmental Quality, Portland. Water Quality Div.
For primary bibliographic entry see Field 5B.
W75-04798

SAMPLING OF VARIABLE, WASTE-MIGRATION PATTERNS IN GROUND WATER,
Michigan State Geological Survey, Lansing.
For primary bibliographic entry see Field 5B.
W75-04799

ROUTINE SURVEILLANCE ALTERNATIVES FOR WATER QUALITY MANAGEMENT,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
R. C. Ward.
Journal Water Pollution Control Federation, Vol 46, No 12, p 2645-2652, December 1974. 1 fig, 18 ref. EPA Project 16080 FUO.

Descriptors: *Management, *Automation, *Monitoring, *Water quality control, Abatement, Baseline studies, Data collections, Remote sensing, *Sampling, Water quality standards, Water pollution control, Water pollution, *Colorado, Alternative planning.
Identifiers: Automatic monitoring, Grab sampling.

Grab sampling, automatic monitoring, and remote sensing techniques were reviewed and the adequacy of their respective roles in providing data bases suitable to the needs of water quality management programs and the character of the water to be managed were examined. Traditionally, grab sampling techniques have been used in documenting trends used in preventive strategies but have limited effectiveness for providing data on extreme water quality of the type needed for abatement activities. Automatic monitoring may be used to supplement grab sampling in a cost-effective manner within certain limitations. Remote sensing is not practical at the present time for routine water quality surveillance because of the high cost involved. However, its spatial coverage may provide a large amount of information in inventory and special survey work. (Harmeson-ISWS)
W75-04803

WATER QUALITY BY PHOTOGRAPHIC ANALYSIS,
Wisconsin Univ., Madison.
S. A. Klooster, and J. P. Scherz.
Photogrammetric Engineering, Vol 40, No 8, p 927-935, August 1974. 10 fig, 1 tab, 15 ref.

Descriptors: *Water quality, Management, *Water pollution, *Aerial photography, Turbidity, Air-water interfaces, Reflectance, Suspended solids, Sampling, Remote sensing, *Pollutant identification.
Identifiers: *Infrared film, *Microdensitometers, Bottom effects, Path luminance.

Five years of research have resulted in a workable and practical aerial reconnaissance technique for correlating water quality parameters to aerial photographs. A positive correlation was determined between reflectance of water and the water quality parameter of turbidity. This relationship is permanent for any particular waste. At certain times other parameters such as suspended solids, correlate to turbidity and may be mapped. Proper analysis of aerial photographs in determining water reflectance requires a standard reflectance panel somewhere in the frame. For such investigation color and color-infrared film are utilized and analyzed with a color microdensitometer which, with some modification, is employed to analyze reflectance of water samples. Noise in the analysis consists of bottom effects, reflection from the air-water interface, and path luminance; all of which may be dealt with by proper techniques. (Leibowitz-FIRL)
W75-04814

SOLUBILITY STUDIES OF METALLIC MERCURY IN PURE WATER AT VARIOUS TEMPERATURES,
Middle East Technical Univ., Ankara (Turkey). Dept. of Chemistry.
E. Onat.
Journal of Inorganic Nuclear Chemistry, Vol 36, No 9, p 2029-2032, September 1974. 3 fig, 2 tab, 24 ref.

Descriptors: *Mercury, *Solubility, *Spectrophotometry, Ions, *Ultraviolet radiation, Aqueous solutions, Heavy metals, *Pollutant identification, Analytical techniques.
Identifiers: *Mercurous perchlorate, Ionic dissociation, Dimeric mercury, Beer's Law, *Metallic mercury.

A method employing ultraviolet spectrophotometry was developed for a direct analysis of soluble mercury in aqueous solutions at various temperatures. Soluble mercury is converted into mercurous form in the presence of mercuric ions, and the absorbance of mercurous perchlorate measured at a wavelength of 236.5 nm was utilized for the quantitative determination of mercury in water. A determination can be made of mercury in as small an amount as 3 x 10 to the minus seventh power g-atom/liter. Twenty-three samples at 6 different temperatures were analyzed, with a standard deviation from compiled data of 0.004. A solubility curve was made on the basis of the results of this experiment. There was no indication of ionic dissociation in dimeric mercury or of deviation from Beer's law. (Leibowitz-FIRL)
W75-04815

WASTEWATER ANALYSIS AND ITS RELATION TO COMPANY PROFITS,
Harnish and Lookup, Associates, Newark, N.Y.
J. A. Kem, and R. Wilson.
Industrial Wastes, Vol 22, No 3, p 26-28, 52, May/June 1974. 8 fig, 2 tab.

Descriptors: *Waste water treatment, *Water pollution, *Industrial wastes, *Food processing industry, Sampling, Discharge, Effluent control, *Pollutant identification.
Identifiers: Peanut butter, Tomato products, Grape products.

In-plant sampling and waste water analysis to estimate the waste water resulting from increased output at the Red Wing Company of Fredonia, New York, was initiated so that individual sources of waste water discharge could be identified for individual control and/or elimination. The program was divided into two parts: an extensive in-plant analysis of the individual process lines and , the unit operation in each line. The sampling included grab samples with measured flow, grab samples with estimated flows, samples composited by flow, and samples composited with time. To double-check, the total waste water loads calculated from production records were compared to the results of a second sampling program on the control plant effluent. The production of jams, jellies, peanut butter, tomato products, grape juice and grape products were investigated. On the basis of the individual unit process sampling results, waste water discharge was accurately predicted for a particular day. It was also determined which production operations result in large waste loadings and which do not. By knowing the individual flows that attend each process, it was possible to determine when processing personnel became careless and discharge more than necessary for given unit operation. (Leibowitz-FIRL)
W75-04817

ASBESTIFORM AMPHIBOLE MINERALS: DETECTION AND MEASUREMENT OF HIGH CONCENTRATIONS IN MUNICIPAL WATER SUPPLIES,
Duluth, Minn. National Water Quality Lab.
P. M. Cook, G. E. Glass, and J. H. Tucker.
Science, Vol 185, No 5154, p 853-855, September 6, 1974. 2 fig, 18 ref.

Descriptors: Pollutants, *Water supply, *Municipal water, Lake Superior, Measurement, Fibers, Sampling, *Minnesota, *Pollutant identification, *Asbestos, Analytical techniques.
Identifiers: *Asbestiform amphibole minerals, Duluth(Minn).

Asbestiform amphibole minerals, which are associated with human health problems, were detected in substantial quantities in minicipal water supplies taken from western Lake Superior water. The total concentrations of amphibole minerals in the Duluth, Minnesota, water supply, were measured by x-ray diffraction of daily samples of suspended solids. They averaged 0.19 milligram per liter with large fluctuations due to seasonal and climatological effects on lake circulation. Electron microscopic examination of these water samples confirmed the presence of asbestiform amphibole fibers. A conservative estimate of the fiber count for 1973 Duluth water supply samples is one to thirty million amphibole fibers identifiable by electron diffraction per liter of water, with a mass concentration of one to thirty micrograms per liter. (Prague-FIRL)
W75-04818

SPHERE METHOD TURBIDIMETER,
Nippon Precision Optical Instrument, Co. Ltd., Tokoyo (Japan).
K. Sato.
Chemical Economy and Engineering Review, Vol 6, No 5, p 26-30, May 1974. 7 fig.

Descriptors: *Turbidity, *Suspended matter, Instrumentation, Effluents, Pre-treatment, Measurement, Activated sludge, Polymers, Pollutant identification, Waste water treatment, Analytical techniques.
Identifiers: *Turbidimeters.

The presence of suspended matter in pre-treated effluents poses some problems such as an increase in fluid resistance and fluid film thickness. To remove solids attached to the membrane , it is important to measure and control the suspended matter in a given sample. A new instrument, the Poic Sphere-Method Turbidimeter, is useful in analysis of fine amounts of impurities. It operates on the principle of measuring both dispersive and parallel transmissions and comparing the two readings: turbidity = Td/Tp x 100 percent. Experiments in Japan used the Turbidimeter to control the quality of seawater and to analyze regional differences in the suspended solids of different seawater. A positive relationship was found between turbidity and solid suspension. Applications of this instrument include pollution control by measuring suspended solids, oil concentration, and activated sludge after pre-treatment; atmospheric research by measuring particulate concentrations; and, a variety of applications in petrochemical and petroleum industries, pharmaceutical industries, and high polymer industries. (Prague-FIRL)
W75-04819

VIROLOGICAL STUDIES IN WATER SYSTEMS: NATURAL OCCURRENCE OF REOVIRUSES AND THEIR INACTIVATION BY PHYSICAL AND CHEMICAL AGENTS,
Iowa Univ., Iowa City.
For primary bibliographic entry see Field 5F.
W75-04821

ANALYZING BIOLOGICAL PROPERTIES OF WASTES,
Colorado State Univ., Fort Collins. Dept. of Microbiology.
S. M. Morrison, and K. L. Martin.
(1972), 12 p, 27 ref.

Descriptors: Analysis, *Farm wastes, *Tests, Pathogenic bacteria, Air pollution, Water pollution, Bacteria, Coliforms, Sampling, Microorganisms, Ecology, *Pollutant identification, Analytical techniques, *Biological properties.
Identifiers: Fecal coliforms, Fecal streptococci, Total plate count.

Because of the growing concern in the control of pollution and environmental hazards it is imperative that some standardization of tests be developed in the field of waste analysis. Many of the problems encountered in the analysis of animal wastes are caused by the variability of the crude product. Measurements or analyses of domestic animal wastes fall into three main categories: (1) standardized tests that have gained professional, governmental, and judicial status; (2) tests which detect disease-causing organisms; and (3) tests for organisms that cause pollution to the environment and are involved in the aesthetic quality of agricultural businesses. The basic standardized tests are for total coliforms, fecal coliforms, enterococci or fecal streptococci, and total plate counts. In the detection of pathogenic organisms there are standardized tests for a broad array of organisms. In the tests for organisms that cause pollution, variables such as temperature, pH, salts, nutrients, oxygen, moisture, nitrogen compounds, and minerals should be taken into account because they affect the growth of organisms. (Russell-East Central)
W75-04842

SURFACE WATER DATA OF THE LLANO TEXAS REGION, PROJECT SANGUINE.
EDAW, Inc., San Francisco, Calif.
For primary bibliographic entry see Field 2E.
W75-04847

5B. Sources Of Pollution

THE EFFECT OF TEMPERATURE AND CHEMICAL POLLUTANTS ON THE BEHAVIOR OF SEVERAL ESTURINE ORGANISMS,
Ichthyological Associates, Inc., Middletown, Del.
For primary bibliographic entry see Field 5C.
W75-04353

AN ANALYSIS OF FOREST WATER PROBLEMS IN GEORGIA,
Georgia Univ., Athens. School of Forest Resources.
For primary bibliographic entry see Field 4D.
W75-04356

THE VARYING SOURCE AREA OF STREAMFLOW FROM UPLAND BASINS,
Georgia Univ., Athens. School of Forest Resources.
For primary bibliographic entry see Field 4D.
W75-04358

NITROGEN RELEASE ASSOCIATED WITH THE DECREASE IN SOIL ORGANIC MATTER IN NEWLY CULTIVATED SOILS,
Technion - Israel Inst. of Tech., Haifa. Soils and Fertilizers Lab.
T. Reinhorn, and Y. Avnimelech.
Journal of Environmental Quality, Vol 3, No 2, p 118-121, April-June, 1974. 2 tab, 2 fig, 18 refs.

Descriptors: *Nitrates, *Potable water, *Soils, *Leaching, *Water pollution, Nitrogen, Cultivated lands, Soil water, Drainage water, Organic matter, Aquifers.
Identifiers: Virgin soils.

High nitrate concentration in sources of drinking water is a world-wide problem. A marked decrease in soil organic matter has been observed during the first years following the cultivation of virgin soils. A series of comparisons between cultivated and virgin soil plots were used to study the release of nitrogen as a result of this cultivation. Results from the area show that the decrease in organic nitrogen from the soil is rather rapid and a steady state is achieved during the first few years. During a certain transition period, the decrease in organic matter in the soil could account for increases in nitrate contents of drainage water. This transition period appears to be short in warm and dry climates, but could be more significant in cold and humid regions were organic matter contents of soils are high. (Mastic-Arizona)
W75-04367

THE USE OF CHIRONOMID PUPAL EXUVIAE FOR CHARACTERIZING STREAMS,
Bristol Univ. (England). Dept. of Zoology.
R. S. Wilson, and P. L. Bright.
Freshwater Biol. Vol 3, No 3, p 283-302. 1973 Illus.
Identifiers: *Chironomid pupal exuviae, *Stream classification, *United Kingdom(River Chew), *Path of pollutants.

Samples of chironomid pupal exuviae were collected by drift netting in the River Chew, Somerset (England) over a period of 4 yr. The samples were analyzed for precentage composition of types and in some cases for numbers of exuviae per unit volume of water sampled. Surface samples contained many more exuviae per unit volume sampled than subsurface samples in the same place, and the catch taken by adjacent nets varied by up to 4 times. The percentage composition of exuvial types remained very consistent under all sampling conditions. Samples taken from other rivers show both similarities and differences between themselves and the River Chew in percentage composition of types. In the River Biss, Wiltshire, a marked change in the exuvial types collected downstream from a sewage effluent outfall was shown after improvements were made to the sewage works. Spring samples from the River Chew showed a change from Tanytarsini- to Orthocladiinae-dominated populations between 1970 and 1972. In the River Chew, exuviae suspended in the stream disintegrated after approximately 1-2 wk. Colored polystyrene balls were used to investigate the downstream movement of floating material in the River Chew. The average stream flow rate was 0.36 m/sec. Some evidence is presented to show that the exuviae float for only about 2 hr in the River Chew before sinking. It is suggested that the area from which most of the sampled exuviae are derived is limited on the River Chew to, at most, 400 m upstream. Provisional identification to genus is given for those exuvial types mentioned. The possibility of using chironomid exuvial analysis as a method of characterizing streams is discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-04371

TEMPERATURE MEASUREMENTS AND INTERNAL WAVES IN SENACA LAKE, NEW YORK,
Lamont-Doherty Geological Observatory, Palisades, N.Y.
For primary bibliographic entry see Field 2H.
W75-04400

RECIPIENT RADIATION EXPOSURE - CIRCULATORY SUPPORT SYSTEMS,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5C.
W75-04419

POPULATION RADIATION EXPOSURE,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5C.
W75-04420

DEVELOPMENT OF AN AIR POLLUTION MODEL FOR THE SAN FRANCISCO BAY AREA. THIRD SEMI ANNUAL REPORT TO THE NATIONAL SCIENCE FOUNDATION.
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 5A.
W75-04421

THE UNRELIABILITY OF TILE EFFLUENT FOR MONITORING SUBSURFACE NITRATE-NITROGEN LOSSES FROM SOILS,
G. W. Thomas, and B. J. Barfield.
J Environ Qual. Vol 3, No 2, p 183-185. 1974 Illus.
Identifiers: Drainage, Effluents, *Monitoring, *Nitrate-Nitrogen, Soils, *Tile effluents, *Path of pollutants, Fertilizers, Water pollution sources.

Investigation of a completely tiled field showed that only a small proportion of the total flow reaching the drainage ditch came from tile effluent. In 2 measurements 63 and 89% of the flow to the drainage ditch came from seepage other than through tiles. The nitrate-N concentrations in the tile effluent were far higher than those calculated in the nontile flow by mass balance. Nitrate-N concentrations in tile effluents may not be reliable indicators of nitrate-N loses from agricultural land, when the tiles do not intercept all subsurface flow.--Copyright 1974, Biological Abstracts, Inc.
W75-04438

BIOLOGIC DETECTION AND CONTROL OF WATER POLLUTION,
Clemson Univ., S. C. Dept. of Microbiology.
For primary bibliographic entry see Field 5C.
W75-04447

NITROGEN MASS BALANCE DETERMINATION FOR SIMULATED WASTEWATER LAND-SPREADING OPERATIONS,
Texas Tech Univ., Lubbock. Water Resources Center.

For primary bibliographic entry see Field 5D.
W75-04449

INTERRELATIONS BETWEEN SULFATE-REDUCING AND METHANE-PRODUCING BACTERIA IN BOTTOM DEPOSITS OF A FRESH-WATER LAKE. I. FIELD OBSERVATIONS,
Hydrobiologisch Institutt, Nieuwersluis (Netherlands).
For primary bibliographic entry see Field 5C.
W75-04469

INTERRELATIONS BETWEEN SULFATE-REDUCING AND METHANE-PRODUCING BACTERIA IN BOTTOM DEPOSITS OF A FRESH-WATER LAKE. II. INHIBITION EXPERIMENTS,
Hydrobiologisch Institutt, Nieuwersluis (Netherlands).
For primary bibliographic entry see Field 5C.
W75-04470

FLUORIDE CONCENTRATIONS IN TWO PACIFIC COAST INLETS-AN INDICATION OF INDUSTRIAL CONTAMINATION,
Fisheries and Marine Service, West Vancouver (British Columbia). Pacific Environment Inst.
R. Harbo, F. McComas, and J. Thompson.
Journal of the Fisheries Research Board of Canada, Vol 31, No 6, p 1151-1154, 1974. 2 fig, 2 tab, 9 ref.

Descriptors: Water pollution, *Fluorides, Analytical techniques, Chemical analysis, Water sampling, Sampling, Statistical methods, Statistics, Water analysis, Connate water, Industrial wastes, Chemical wastes, *Water pollution sources, *Canada, *Path of pollutants.
Identifiers: *Anthropogenic fluoride, *Aluminum smelting wastes, Kitimat River estuary(Canada), Howe Sound(British Columbia).

This study was undertaken to better understand the effects of anthropogenic fluoride upon estuarine and marine ecosystems. A comparison of fluoride levels in Kitimat Arm, where fluoride wastes have been discharged for nearly twenty years, and of Howe Sound, British Columbia, where there is not known to be any input of non-natural fluoride, indicated that some contamination has occurred. A statistical treatment of the data further serves to demonstrate this conclusion. (Orr-FIRL)
W75-04473

CHEMICALS AND ALLIED PRODUCTS, (LITERATURE REVIEW),
Union Carbide Corp., South Charleston, W. Va.
For primary bibliographic entry see Field 5G.
W75-04474

A STUDY OF THE WASTE WASH WATER FROM EGG WASHING MACHINES,
Richard B. Russell Agricultural Research Center, Athens, Ga.
D. Hamm, G. K. Searcy, and A. J. Mercuri.
Poult Sci, 53(1): 191-197, Illus, 1974.
Identifiers: *Chemical oxygen demand, Egg washing machines, Solids, Waste wash, Water pollution sources, Industrial wastes, Southeast U.S.

The egg washer waste waters from 11 grading and breaking plants in the Southeast were sampled and characterized for the common pollution parameters. Egg grading plants studied used an average of 4.6 l of water per case for egg washing. Breaking plants used 3.4 l of water per case for washing. Measured median waste concentrations for the wash waters were: for the grading plants-Chemical Oxygen Demand (COD) 7300 mg/l, total solids 9300 mg/l, volatile solids 4600 mg/l; for the breaking plant washers-COD 22,500 total solids 27,000, and volatile solids 16,6000 mg/l.--Copyright 1974, Biological Abstracts, Inc.
W75-04475

PETROLEUM HYDROCARBONS IN NARRAGANSETT BAY: I. SURVEY OF HYDROCARBONS IN SEDIMENTS AND CLAMS (MERCENARIA MERCENARIA),
Woods Hole Oceanographic Institution, Mass. Dept. of Chemistry.
J. W. Farrington, and J. G. Quinn.
Estuarine Coastal Mar Sci, Vol 1, No 1, p 71-79, 1973. Illus.
Identifiers: Bays, *Clams, Mercenaria-mercenaria, *Oil pollution, Petroleum, Pollution, *Sediments, Sewage, Survey, Oil spills, *Massachusetts(Narragansett Bay), Pollutant identification.

Analyses of hydrocarbons in surface sediments from 8 stations in clams (M. mercenaria) from 3 stations in Narragansett Bay show that both contain a very complex mixture of hydrocarbons which is not present in clams from Charlestown Pond, a relatively unpolluted coastal pond. This complex mixture of hydrocarbons is present in crude and fuel oils and it is not a likely product of recent biosynthesis by marine organisms. The sediments and clams from the areas sampled in Narragansett Bay are probably contaminated by petroleum hydrocarbons. Sewage effluents and small oil spills are the most probable sources of the petroleum hydrocarbons. (See also W75-04478)--Copyright 1974, Biological Abstracts, Inc.
W75-04477

PETROLEUM HYDROCARBONS IN NARRAGANSETT BAY: II. CHEMICAL AND ISOTOPIC ANALYSIS,
Woods Hole Oceanographic Institution, Mass. Dept. of Chemistry.
O. C. Zafiriou.
Estuarine Coastal Mar Sci, Vol 1, No 1, p 81-87, 1973. Illus.
Identifiers: Agriculture, Bays, Carbon-14, Chemical analysis, Forests, Isotopic analysis, Microorganism, Oil, Petroleum, Sediments, Sewage, Oil spills, *Massachusetts(Narragansett Bay), Oil pollution, *Pollutant identification.

Upper Narragansett Bay surficial sediments contain a complex mixture of hydrocarbons at over 10 times the levels of the lower Bay. 14C and chemical analyses indicate that petroleum is the predominant source of these hydrocarbons; the data exclude as predominant sources microbiologically synthesized hydrocarbons, land runoff, domestic wastes and forest and agricultural products. The hydrocarbons are characterized by low 14C content, by the presence of over 1000 components, including the isoprenoid hydrocarbons pristane and phytane and several homologous series of alkylaromatic compounds. The ubiquitous normal alkanes are not present in significant amounts. Sewage effluents and small oil spills discharged to Narragansett Bay may be chemically modified by evaporation, dissolution and partial biochemical oxidation to yield the observed hydrocarbon distribution. (See also W75-04477)--Copyright 1974, Biological Abstracts, Inc.
W75-04478

EFFECT OF QUALITIES OF IRRIGATION WATER AND FERTILIZERS ON SOIL PROPERTIES, YIELD AND NUTRIENT UPTAKE BY WHEAT,
S.K.N. Coll. of Agriculture, Jobner (India). Dept. of Agricultural Chemistry and Soil Science.
For primary bibliographic entry see Field 3F.
W75-04482

ABUNDANCE, DIVERSITY AND SEASONAL PATTERNS OF ESTUARINE FISH POPULATIONS,
Environmental Protection Agency, Washington, D.C. Office of Technical Analysis.
For primary bibliographic entry see Field 5C.
W75-04485

DISSOLVED AND PARTICULATE HUMIC ACID IN AN EAST COAST ESTUARY,
Adelphi Univ., Oakdale, N.Y. Inst. of Marine Science.
M. E. Hair, and C. R. Bassett.
Estuarine Coastal Mar Sci, Vol 1, No 1, p 107-111, 1973, Illus.
Identifiers: Coasts, *Estuary, *Humic acid, Particulates, Salinity, Seasonal, *Path of pollutants.

Seasonal variations in dissolved and particulate humic acids were studied for a 1 yr period in an East Coast estuary. Particulate humic acids accounted for the bulk of the 2 fractions. The general seasonal trend of both fractions showed a sharp increase in concentrations in the spring followed by a decrease during the summer and winter months. Concentrations of humic acids were related to salinity levels in this stratified system.--Copyright 1974, Biological Abstracts, Inc.
W75-04504

A SYSTEMS ANALYSIS OF WATER QUALITY SURVEY DESIGN,
Clemson Univ., S. C.
L. C. Wilcox, R. W. Gilchrist, M. Wolla, J. F. Andrews, and B. E. Gilliland.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD 787 529, $5.25 paper copy, $2.25 microfiche. Department of the Army, Second Annual Report. U.S. Army Medical Research and Development Command, Washington, D.C., July 1974. 101 p, 10 fig, 2 tab, 2 append.

Descriptors: *Systems analysis, *Water quality control, *Surveys, *Design, Measurement, *Simulation analysis, *Water sampling, Monitoring, Data collections, Management, Sewers, Networks, Mathematical models, Computer programs, Path of pollutants.
Identifiers: Army ammunition plants, Manufacturing processes.

The design of water quality surveys is being investigated in a 3-year project by an interdisciplinary team using systems analysis; this is the second annual report. The surveys being studied are 15 days in length and designed to characterize pollutant types and levels at the site being monitored. Needed are a 'best' sampling and analysis program to maximize data collection and an information management system. Each principal process associated with munitions manufacture is modeled to provide a pollutant load as a function of production level. These process models, plus a topological model of the plant site which defines the sewer network, produce the steady-state pollutant load at each point in the sewer network and at the plant effluent points. These are combined with a model defining United States Army Environmental Health Agency resources available for measurement, sampling, and analysis. The resulting resource matching model defines the feasible monitoring schemes and gives an indication of performance and utilization of resources. The second year's work reported here involved: creation of a library of processes sufficient to describe 6 different types of munitions manufacturing plants; changes in the process model to allow for differences in plants; collection of data for refinement of resource and topology models; improved user-model interface; demonstration of survey planning program on two sites; development and demonstration of data handling software; and documentation and workshops. (Bell-Cornell)
W75-04522

MODELING SEWAGE TREATMENT PLANT INPUT BOD DATA,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5D.
W75-04528

PARAMETER IDENTIFICATION IN DISTRIBUTED SYSTEMS USING A DIGITAL SIMULATION LANGUAGE: AN EXTENSION OF PDEL,
California Univ., Los Angeles.
For primary bibliographic entry see Field 6A.
W75-04540

REDUCING FEEDLOT NITRATES IN YOUR GROUND WATER,
J. R. Watson.
Crops and Soils, Vol 24, No 3, p 17-18, December, 1971. 4 fig, 1 tab.

Descriptors: *Nitrates, *Feed lots, *Groundwater movement, Soil profiles, *Nebraska, Leaching, Sampling, *Water pollution sources.

U.S. Department of Agriculture/Agricultural Research Service and Soil and Water Conservation scientists, and the Department of Agronomy at the University of Nebraska have been studying the movements of nitrates and other solubles in soil profiles under beef cattle feedlots. In general, oxygen and nitrogen concentrations are considerably depleted, while carbon dioxide and methane are plentiful. The ammonium-nitrogen and total nitrogen concentrations are higher near the surface, although no nitrates were found. To guard against the possibility of nitrate leaching, however, the following procedures are recommended to all cattle farmers: avoid frequent and extensive scraping of the feedlot surface, and leave the surface soil relatively undisturbed when removing manure from the feedlot. On-lot decomposition is encouraged. In this way, leaching of the soil will be minimized as will its oxygen concentration. Low oxygen concentrations are desirable since oxygen interferes with the reducing environment in which nitrates are converted to harmless nitrogen gas. (East Central State College)
W75-04547

SURFACE WATER QUALITY IS INFLUENCED BY AGRICULTURAL PRACTICES,
Minnesota Univ., Morris.
R. F. Holt.
Transactions of the ASAE (American Society of Agricultural Engineers,) Vol 16, No 3, p 565-568, 1973. 3 tab, 34 ref.

Descriptors: *Surface waters, *Water quality, *Water pollution sources, *Fertilizers, *Farm wastes, Pesticides, *Agricultural runoff, Phosphorus, Nitrogen, Feed lots, Soil contamination, Diseases, Nutrients, Soil conservation, Waste disposal, Fishkills, *Biochemical oxygen demand.
Identifiers: Agricultural practices, Leptospirosis.

The effects of fertilizer runoffs, pesticides, and feed lot wastes on surface water quality are discussed. The three constituents of animal waste that pose a threat to water quality are BOD, infectious agents, and dissolved chemicals, which are primarily nutrients. Rapid influxes of animal waste into waterways can cause massive fish kills, due to reduced oxygen levels; constant, but less rapid, contamination will simply drive the fish away, killing only less mobile forms. Medium textured, well drained soil can degrade 250 to 300 lb of BOD per acre per day. The soil also quickly destroys pathogens, such as streptococcus, anthrax, hog cholera, and mastitis. Although few of these diseases infect man, all can be transmitted to other animals. Plant nutrients, most frequently nitrogen and phosphorus, allowed to run off into streams, either directly from the feed lot or indirectly after application to frozen or saturated soils, are also detrimental to water quality. If manure is disced in as soon as applied, runoff of nutrients is avoided. (East Central State College)
W75-04548

THE DEVELOPMENT OF A MATHEMATICAL MODEL TO PREDICT RUNOFF WATER QUALITY FROM WATERSHEDS,
Texas A and M Univ., College Station.
J. B. Malouf.
Available from Xerox University Microfilms, Ann Arbor, Mich, 48106, Order No 74-21,211. Ph.D. Thesis, p 196, 1974.

Descriptors: *Mathematical models, *Urban runoff, *Water quality, *Surface runoff, Storm runoff, Precipitation(Atmospheric), Runoff forecasting, Watersheds(Basins), Hydrographs.
Identifiers: Qual Model.

A mathematical model, the Qual Model, to predict the quality of watershed runoff has been developed. Runoff that moves over a basin and the pollutants that are dissolved or suspended in it are evaluated. The pollutants are substances generally deposited as a result of human activity within the basin that are present on streets, surfaces, sidewalks, driveways, roofs, grassed areas, alleys, gutters, and storm drains. The model is based on the assumption that the rate of pollutant removal by surface runoff is proportional to the amount of pollutant remaining and to the runoff intensity. The pollutants found on the basin before rain are obtained from literature and used to evaluate the quality of runoff with respect to time from any watershed. The simulation of urban runoff considers the urban runoff process as composed of precipitation, runoff, and quality which interact to predict the quality found in urban storm water runoff. The model may be applied to any watershed if the basic hydrographic data and surface characteristics are known. Improvements need to be incorporated into this model as more data and a further understanding of the basic mechanisms involved become available. (Orr-FIRL)
W75-04551

AN EXPERIMENTAL STUDY OF THE FREE SURFACE EFFECT ON A BUOYANT JET,
General Dynamics Corp., Groton, Conn. Electric Boat Div.
For primary bibliographic entry see Field 8B.
W75-04559

WASTEWATER CHARACTERIZATION FOR THE SPECIALTY FOOD INDUSTRY,
American Frozen Food Inst., Washington, D.C.
C. J. Schmidt, E. V. Clements III, and J. Farquhar.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Environmental Protection Agency, Corvallis, Oregon, Report EPA-660/2-74-075, p.134, December 1974, 25 tab, 2 append. 1BB037, EPA Grant No R-801684.

Descriptors: *Industrial wastes, *Foods, Canneries, *Waste Identification, Waste treatment, Water pollution control, Water pollution sources, Waste water treatment.
Identifiers: Specialty foods, *Waste characterization.

The specialty food industry generally falls within standard industrial classification (SIC) Codes 2032, 2035 and 2037 and includes approximately 2,300 plants in the United States which produce a wide variety of food products. For waste categorization purposes the specialty food industry was divided into ten categories on the basis of ingredients used, type of product, and liquid waste generation. Twenty-six nationally distributed specialty food plants were investigated and 24 of these field sampled for ten days each to determine raw wastewater characteristics and volume. Related production and processing information was used to calculate the wastewater generation per 1,000 kilograms of production in terms of: 5 day Biochemical Oxygen Demand, Chemical Oxygen Demand, Suspended Solids, Volatile Suspended Solids, Total Phosphorus, Total Kjeldahl Nitrogen, and Grease and Oil. (EPA)
W75-04560

DRY CAUSTIC PEELING OF CLINGSTONE PEACHES ON A COMMERCIAL SCALE,
Del Monte Corp., San Francisco, Calif.
For primary bibliographic entry see Field 5D.
W75-04564

WATER RECYCLE/REUSE POSSIBILITIES: POWER PLANT BOILER AND COOLING SYSTEMS,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5D.
W75-04566

MANUAL FOR DEICING CHEMICALS: APPLICATION PRACTICES,
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5G.
W75-04567

MANUAL FOR DEICING CHEMICALS: STORAGE AND HANDLING,
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5G.
W75-04568

MERCURY IN AQUATIC SYSTEMS: METHYLATION, OXIDATION-REDUCTION, AND BIOACCUMULATION,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
H. W. Holm, and M. F. Cox.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.20402, price $1.05. Environmental Protection Agency, Corvallis, Oregon, report EPA-660/3-74-021, p 38, August 1974. 3 fig, 12 tab, 42 ref, 3 append. ROAP 21 AIM Task 11.

Descriptors: *Heavy metals, *Aquatic bacteria, *Food chains, Microbiology, Fish food organisms, Growth rates, *Mercury, Trace elements, *Path of pollutants, Absorption.
Identifiers: *Transformations, *Methylmercury, Bioaccumulation, Methylation.

The role of organisms on the fate of mercury in aquatic environments was evaluated. Objectives were (1) to quantitate transformations of mercury in water-sediment systems, (2) to investigate the fate of elemental mercury in microbial growth systems, and (3) to measure the concentration of total and methylmercury in food chain organisms. In anaerobic water-sediment systems spiked with calcium acetate and mercuric chloride, elemental mercury was produced in larger quantities than methylmercury. The rate of methylation of mercury in aerobic environments was comparable to that in anaerobic environments; however, the rate of release of elemental mercury to the atmosphere during aerobic incubation was nearly three times that observed during anaerobic incubation. No dimethylmercury was produced in these systems. In water-sediment systems, added elemental mercury was oxidized and deposited in the sediments where small amounts of methylmercury were formed. Six pure cultures of bacteria oxidized elemental mercury, but none formed methylmercury. Two Pseudomonas species did not grow in the presence of elemental mercury. In a stream receiving mercuric ion, mosquito fish contained more methylmercury than did tadpoles, snails, and aquatic insects. Algae did not contain methylmercury, even though their total mercury levels were high. (EPA)

W75-04570

ORGANIC COMPOUNDS ENTERING GROUND WATER FROM A LANDFILL,
Oklahoma Univ., Norman. School of Civil Engineering and Environmental Science.
J. Robertson, C. R. Toussaint, and M. Jorque.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 237 969, $4.25 paper copy, $2.25 microfiche. Environmental Protection Agency, Report EPA-660/2-74-077, September 1974, 47 p, 7 fig, 6 tab, 24 ref. 21 AKQ, Task 13, EPA R801417.

Descriptors: *Groundwater movement, *Landfills, *Water pollution sources, *Organic compounds, *Leachate, Water pollution, Water pollution control, Organic wastes, Gas chromatograph, Mass spectrometry, Path of pollutants, Activated carbon, Polychlorinated biphenyls, Environmental effects, Aquifers, Sampling, Organic acids, Pollutant identification.
Identifiers: *Carbon adsorption method, Organic Carbon, Refuse, Industrial organic chemicals.

Organic compounds leached into ground water from a landfill containing refuse deposited below or near the water table were investigated. Ground water from wells within or near the landfill and a control well was sampled by modified low-flow carbon adsorption procedures incorporating all glass-teflon systems to preclude introduction of extraneous organics. Column chromatography, solubility separation, and gas chromatography-mass spectrometry were employed for separation, identification, and quantitation of individual compounds in organic extracts. The ground water was shown to contain low levels of many undesirable organic chemicals leached from the landfill. Of those compounds identified (over 40), most were chemicals commonly employed in industry for manufacturing many domestic and commercial products. The source of these compounds was apparently manufactured products discarded in the landfill, since it had not received appreciable wastes from industrial operations. Because the age of the refuse in the area studied was at least three years, the compounds identified were believed to be substances leached very slowly from the refuse and/or transported away from the landfill very slowly because of adsorption on aquifer solids. Potential long-term pollution of ground water by industrial organic chemicals from landfills may be indicated by this work. (EPA)
W75-04573

ACID-IRON WASTE AS A FACTOR AFFECTING THE DISTRIBUTION AND ABUNDANCE OF ZOOPLANKTON IN THE NEW YORK BIGHT: II. SPATIAL VARIATIONS IN THE FIELD AND IMPLICATIONS FOR MONITORING STUDIES,
Harvard Univ., Cambridge, Mass. Biological Labs.
P. H. Wiebe, G. D. Grice, and E. Hoagland.
Estuarine Coastal Mar Sci. Vol 1, No 1, p 51-64. 1973 Illus.
Identifiers: *Acid-iron wastes, Biomass, Calanus-Finmarchicus, Distribution, *Monitoring, *New York Bight, Plankton, Pseudocalanus-Sp, Spatial variations, Temora-Longicornis, *Zooplankton.

A study was undertaken in the New York Bight in an effort to understand small scale variations of single populations and coastal zooplankton communities as they relate to the disposal of acid wastes. Two grids of 8 locations each, 1 day and 1 night station per location, were placed so that one covered the acid grounds and the other a similar area functioning as a control 9 km to the northeast. Thirty-nine taxonomic categories of zooplankton were counted from oblique net tow samples collected at the 32 stations. Biomass was determined from length measurements of individuals of 24 taxa. Species composition of the samples was typical of neritic waters of the northeast Atlantic coast. The spatial distribution of the majority of the species was markedly aggregated, but no trend was observed which would suggest that the acid wastes were an important factor in shaping the distributions. Species did not show collective agreement as to the area in which a higher average abundance for each occurred; and no significant trends in percent similarity or diversity (Simpson's D and the information theory H') were evident. Although Vaccaro et al. found zooplankton biomass to be approximately 30% higher from the control area than from the acid grounds, comparison of the biomass difference between the 2 areas on a species by species basis showed that 95% of the overall difference was accounted for by only 3 spp., Pseudocalanus sp. and its copepodids, Calanus finmarchicus copepodids and Temora longicornis. The acid-iron wastes appeared to be a minor factor affecting the distribution and abundance of zooplankton species during the time of this investigation. (See also W72-11570) --Copyright 1974, Biological Abstracts, Inc.
W75-04574

OPTIMAL WEIGHTING FUNCTION IN WATER QUALITY MODELING,
University of Southern California, Los Angeles. Dept. of Electrical Engineering, and Materials Science.
E. S. Lee, and P. K. Misra.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-234 419 $3.75 in paper copy, $2.25 microfiche. June 1973. 33 p, 10 fig, 3 tab, 49 equ, 5 ref. OWRT C-3051(No. 3678).

Descriptors: *Water quality, *Simulation analysis, *Mathematical models, *Optimization, Dissolved oxygen, Biochemical oxygen demand, Equations, Estimating, Least squares method, Time, Systems analysis.
Identifiers: *Weighting function, *Dynamic modeling, Gradient approach, Calculus of variations, Sequential search technique, Convergence rate.

In an earlier paper by Lee and Hwang (See W71-06587), the invariant imbedding concept was applied to the dynamic modeling of stream quality. In the approach presented herein, a set of weighting functions is introduced. The initial conditions for these weighting functions must be estimated. These initial conditions influence the convergence rate tremendously. In many water quality control situations, the number of experimental data points is limited. In order to obtain the best estimates with limited experimental data, the best convergence rate should be used. In this work, the least squares criterion combined with various optimization techniques, including a sequential search technique and a gradient approach, is used to obtain the optimal initial conditions for the weighting functions. The proposed schemes greatly improve the convergence rate. (Bell-Cornell)
W75-04614

CHARACTERISTICS AND SOIL TREATMENT OF BIOLOGICALLY TREATED SWINE WASTES, VOL. I, CH.1 THRU 3,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 5D.
W75-04623

CHARACTERISTICS AND SOIL TREATMENT OF BIOLOGICALLY TREATED SWINE WASTE, VOL II, CH. 4, THRU 7,
Kansas Water Resources Research Inst., Manhattan.
For primary bibliographic entry see Field 5D.
W75-04624

ACID MINE WATER, A BIBLIOGRAPHY,
Office of Water Research and Technology, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04625

MANURE APPLICATION GUIDELINES FOR THE PACIFIC NORTHWEST,
Oregon State Univ., Corvallis. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5G.
W75-04631

ENTEROBACTERIA IN FEEDLOT WASTE AND RUNOFF,
Agricultural Research Service, Peoria, Ill. Northern Marketing and Nutrition Research Div.
For primary bibliographic entry see Field 5A.
W75-04633

NONPOINT AGRICULTURAL POLLUTION: STATUS OF ASSESSMENT METHODOLOGY,
Midwest Research Inst., Kansas City, Mo.
A. Aleti, S. Y. Chiu, and A. D. McElroy.
Paper No. 74-4025 presented at the 1974 Annual Meeting of American Society of Agricultural Engineers, Oklahoma State University, Stillwater, June 23-26, 1974, 16 p, 2 fig, 2 tab, 27 ref.

Descriptors: Agriculture, *Water pollution sources, *Model studies, Nutrients, Microorganisms, Pesticides, Salts, Runoff, Pollutants, Forecasting, Sediments, Path of pollutants.
Identifiers: *Nonpoint pollution(Agricultural).

Agriculture is a major contributor to nonpoint pollution. Agriculture pollutes water with such substances as sediments, salts, nutrients, pesticides, biodegradable organics, and microbial populations. These pollutants are the result of natural factors and source practices. The present difficulty with nonpoint pollution control is the inability to assess, in quantitative terms, the effect of control measures. The overall need is to develop comprehensive models which include all pollutants, which are sensitive to the causes of these pollutants, and which recognize interdependencies between pollutants in order to facilitate development of simplified control measures. Some of the needs basic to the construction of these models are: data gaps; analyses of transport phenomena; evaluation of current and past case studies; model-orientated case studies conducted on a wide scope; collection and storage of information; and, systematic analysis of large volumes of data. (Russell-East Central)
W75-04645

FEEDLOT WASTE EFFECTS ON SOIL CONDITIONS AND WATER EVAPORATION,
Southwestern Great Plains Research Center, Bushland, Tex.
P. W. Unger, and B. A. Stewart.
Soil Science Society of America Proceedings, Vol 38, No 6, p 954-957, November-December, 1974. 2 fig, 1 tab, 14 ref.

Descriptors: *Soil water, *Feed lots, *Bulk density, Porosity, Organic matter, *Evaporation, *Farm wastes, Aggregation, Soil properties, Water pollution sources.

Feedlot wastes were applied to field plots at 0, 22, 67, 134, or 268 metric tons/hectare for 4 successive years. Core and bulk soil samples from the plots were used to evaluate treatment effects on soil water retention, bulk density, strength, porosity, organic matter content, and water-stable aggregates. Evaporation was determined from laboratory columns containing feedlot-waste-treated soil at the surface and untreated soil below the treated soil. For soils treated with feedlot wastes at high rates, water contents at saturation and at -0.2 and -1.5 bars matric potential were significantly higher, and bulk densities were significantly lower, than for untreated soils or those treated at low rates. Soil strength, porosity index

values, and water contents at -15 bars matric potential were not significantly affected by waste applications. Soil organic matter and aggregation increased and evaporation decreased as waste application rates increased. (Roberts-ISWS)
W75-04699

MICROMETEOROLOGICAL MEASUREMENTS FOR PESTICIDE DRIFT STUDIES,
Missouri Univ., Columbia. Dept. of Agricultural Engineering.
C. E. Goering, and B. J. Butler.
Transactions of the American Society of Agricultural Engineers, Vol 17, No 6, p 1104-1107, November-December 1974. 5 fig, 9 ref.

Descriptors: *Pesticide drift, *Micrometeorology, Atmospheric physics, Boundary layers, Winds, Bridges(Electric), Temperature, *Pesticide drift, *Path of pollutants.
Identifiers: Wind sensors, Thermistor bridges, Hygrothermographs, Temperature probes.

A weather instrumentation system was developed for use in pesticide drift studies initiated at the University of Illinois in the fall of 1972. A 10-m mast was erected in a level, open area for supporting the weather sensor. Six channels of strip chart recorder were used to record signals from three 3-cup anemometers, a microvane, a propeller anemometer, and a thermistor bridge. Mean values of these signals were obtained by planimetering the charts over 100 seconds of record. Mean values of horizontal wind were measured at 10-m, 2-m, and 0.5-m heights. A thermistor bridge measured the temperature difference between 2-m and 10-m height. Atmospheric instability was indicated by measuring vertical air speeds at 1 m with a propeller anemometer. A hygrothermograph and a microbarograph were used to record dry bulb temperature, relative humidity, and atmospheric pressure. Data collected were in reasonable agreement with accepted micrometeorological theory. (Roberts-ISWS)
W75-04714

CHEMICAL AND PHYSICAL CHARACTERIZATION OF TAR SAMPLES FROM THE MARINE ENVIRONMENT,
Shell Development Company, Houston, Tex. Bellaire Research Center.
For primary bibliographic entry see Field 5A.
W75-04718

DETERMINATION OF THE MOLECULAR SOLUBILITY OF NAVY OILS IN WATER,
Naval Ordnance Lab., White Oak, Md.
For primary bibliographic entry see Field 5A.
W75-04722

NUTRIENT ENRICHMENT OF GROUNDWATER FROM SEPTIC TANK DISPOSAL SYSTEMS,
Wisconsion Univ., Madison. Dept. of Geology and Geophysics.
For primary bibliographic entry see Field 5C.
W75-04758

CHANNEL FLOW DRIVEN BY A STATIONARY THERMAL SOURCE,
Massachusetts Inst. of Tech., Cambridge.
For primary bibliographic entry see Field 8B.
W75-04793

SUBSURFACE SEWAGE DISPOSAL AND CONTAMINATION OF GROUND WATER IN EAST PORTLAND, OREGON,
Oregon State of Environmental Quality, Portland. Water Quality Div.
E. L. Quan, H. R. Sweet, and J. R. Illian.
Ground Water, Vol 12, No 6, p 356-367, November-December 1974. 8 fig, 1 tab, 10 ref.

Descriptors: *Water pollution, *Cesspools, *Septic tanks, *Domestic wastes, *Soil disposal fields, Nitrates, Water pollution sources, Groundwater movement, Deep percolation, Groundwater recharge, *Oregon, *Path of pollutants, Pollutant identification.
Identifiers: Multnomah County(Ore), Portland(Ore).

East Portland and central Multnomah County have changed from a rural-suburban to a locally urban community with community water and sewer. However, a 30-square mile area within central Multnomah County remains usewered and reportedly disposes of 8 to 10 mgd sewage via cesspools, seepage beds, and drainfields. These methods of waste disposal have resulted in the degradation of the groundwater resource. Central Multnomah County receives groundwater recharge from the Cascade Mountains to the east and intermediate recharge from the Cascade foothills and other isolated hills bordering and within the area. The primary groundwater recharge source is infiltrating precipitation. However, due to development and its attendant reduction in infiltration area, there has been a decrease in natural recharge. The domestic waste which is disposed of via the subsurface is introduced as supplemental local recharge. The depth to which the local recharge can penetrate the water table is limited by its hydraulic potential and the vertical hydraulic conductivity of the substrata. Therefore, the NO3-N contaminated recharge is effectively buoyed up and migrates laterally along the upper portion of the water table to its eventual surface drain, Columbia Slough South Arm. Water samples from wells developing water in adjacent or upgradient sewered areas and/or from deeper aquifers within the unsewered area generally have NO3-N concentrations of less than 1 mg/1. Shallower wells and springs within the unsewered area and South Arm Slough, downgradient from the unsewered area, had NO3-N concentrations ranging from 4.7 to 11.86 mg/1, with a mean value of 7.74 mg/1 in July 1974. (Gibb-ISWS)
W75-04798

SAMPLING OF VARIABLE, WASTE-MIGRATION PATTERNS IN GROUND WATER,
Michigan State Geological Survey, Lansing.
K. E. Childs, S. B. Upchurch, and B. Ellis.
Ground Water, Vol 12, No 6, p 369-376, November-December 1974. 4 fig, 2 tab, 15 ref.

Descriptors: *Water pollution sources, *Septic tanks, *Path of pollutants, *Michigan, *Water pollution, Waste water(Pollution), Sampling, Monitoring, Chemicals, Soil contamination, Groundwater movement, Adsorption, Investigations, Measurement, On-site data collections, On-site investigations.
Identifiers: *Waste migration, *Plumes, Houghton Lake(Mich).

A survey of waste-migration patterns from septic-tank/tile-field systems surrounding Houghton Lake, Michigan, indicated that sampling plans designed to detect and quantify waste migration in groundwater should be predicted on the concept that the waste plume may be complex and that the plume may not follow regional, groundwater flow. The waste-migration plumes at Houghton Lake range from simple, multichemical plumes that move with regional flow to complex plumes that bifurcate, that show different migration patterns for different chemicals, and that move up the regional gradient for short distances. The complexity of these patterns was attributed to a combination of the following system properties: loading rate and recharge at the waste source, local hydrology, chemical-adsorption capacity of the soil, soil microbiology, regolith texture and fabric, and proximity to other waste sources. Based on the observed patterns, it was suggested that observation wells be placed so that an in-depth, 3-dimensional array of samples can be obtained. The wells should be of sufficient depth to insure that deep-moving plumes can be detected and, if the actual, vertical-migration pattern is of importance, the wells should allow collection of water samples at a number of depths. The waste-migration pattern should be monitored throughout the year in anticipation of vertical movement of the plume axis during periods of surface recharge. If more than one chemical is of interest, then it unsafe to assume that an index chemical, such as chlorides, demonstrates the migration of the other chemicals and analyses must be run for the other chemicals. (Sanderson-ISWS)
W75-04799

WILL CURRENT RESEARCH ANSWER TODAY'S PROBLEMS AT THE SANITARY LANDFILL.,
Auburn Univ., Ala. Water Resources Research Inst.
J. C. Warman, R. K. Rainer, and A. S. Chipley.
Ground Water, Vol 12, No 6, p 378-386, November-December 1974. 1 fig, 1 tab, 1 ref, 1 append.

Descriptors: *Landfills, *Waste disposal, *Waste dumps, *Solid wastes, *Alabama, Leachate, Soil management, Environmental engineering, Public health, Garbage dumps, Ultimate disposal, Monitoring, Inspection, Wastes, Water pollution sources, Regulation, Research priorities, Management, Training.
Identifiers: *Sanitary landfills.

Alabama's solid waste management program has been commended repeatedly by the U.S. Environmental Protection Agency for establishing and operating throughout nearly all of the state effective, county-wide, state-approved, rural solid waste collection and disposal systems. The program is administered and regulated by the Division of Solid Waste and Vector Control of the Environmental Health Administration. Collecton systems, sanitary landfills, and other parts of the program are rated by the regulatory agency; rating of landfills is used in enforcement. In 1974, 87.0% of the 67 counties in Alabama representing 97.0% of the total state population of 3,444,000 had total collection and disposal systems. The two greatest problems in the sanitary landfill program are disposal of hazardous industrial wastes and training of operators. Current research throughout the nation on groundwater pollution related to sanitary landfills was reviewed to identify expected research results that will help solve the problems. (Sanderson-ISWS)
W75-04800

RATIONAL BASIS FOR SEPTIC TANK SYSTEM DESIGN,
Connecticut Univ., Storrs. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-04801

SOURCES OF METALS IN NEW YORK CITY WASTEWATER,
New York City Dept. of Water Resources. Industrial Wastes Control Section.
L. A. Klein, M. Lang, N. Nash, and S. L. Kirschner.
Journal Water Pollution Control Federation, Vol 46, No 12, p 2653-2662, December 1974. 1 fig, 13 tab.

Descriptors: *Water pollution sources, *Domestic wastes, *Industrial wastes, *Metals, *Storm water, *Water supply, Cadmium, Chromium, Copper, Effluents, Heavy metals, Nickel, Runoff, Sludge, Sludge disposal, Waste water treatment, Zinc, Atlantic Ocean, New York, Hudson River.
Identifiers: *New York City(NY).

In an attempt at rendering as strict an accounting as possible for copper, chromium, nickel, zinc, and cadmium found in New York City waste-

waters, samples from industrial effluents, surface runoff, waste treatment plant influents and effluents, the water supply, and the rivers and harbors were extensively analyzed. Results indicated that contributions of metals to wastewater from the electropolating industry may be significantly overshadowed by those from non-industrial sources which are more difficult to control. Electroplating is the largest single contributor of both chromium and nickel. On the other hand, water supply, storm water runoff, and residential wastes are larger contributors of copper and zinc. Cadmium contributed by residential wastes exceeds that from the electroplaters. Extensive tabulations of total daily weights of metals and average concentrations were presented. (Harmeson-ISWS)
W75-04805

TRACE METALS IN WASTEWATER EFFLUENTS,
University of Southern California, Los Angeles. Environmental Engineerig Program.
K. Y. Chen, C. S. Young, T. K. Jan, and N. Rohatgi.
Journal Water Pollution Control Federation, Vol 46, No 12, p 2663-2675, December 1974. 8 fig, 7 tab, 6 ref.

Descriptors: *Centrifugation, *Metals, *Filtration, *Waste water treatment, Cadmium, Chromium, Copper, Iron, Lead, Manganese, Mercury, Nickel, Zinc, Effluents, Sediments, Sludge, Separation techniques, *Trace elements, Pacific Ocean, *California.
Identifiers: Atomic adsorption, Los Angeles(Calif).

Because of the nature of its primary and secondary treatments and the discharge of wastewater and sludge effluents, the Hyperion Treatment Plant, Los Angeles, California, was selected for an intensive study to characterize trace metals in the effluents of different waste treatment processes. The chief concern of the study was the portioning of trace metals into the dissolved and particulate phases and the size distribution of the particulate-borne fractions in wastewater effluents and digested sludge. With the exception of nickel, mangenese, and lead, secondary treatment was found to be moderately effective in removing trace metals in the particulate fraction. On a dry weight basis, trace metals in the particulate fractions of wastewater effluents and digested sludge were found to be within a narrow range. (Harmeson-ISWS)
W75-04806

UNIFORM DISTRIBUTION IN SOIL ABSORPTION FIELDS,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5D.
W75-04807

EFFECT OF RATION ON MANURE SALT CONTENT,
Texas Tech Univ. Center at Amarillo, Pantex.
For primary bibliographic entry see Field 5D.
W75-04834

AMOUNTS, COMPOSITION, AND MANAGEMENT OF FEEDLOT RUNOFF,
Southwestern Great Plains Research Center, Bushland, Tex.
For primary bibliographic entry see Field 5D.
W75-04835

WATER QUALITY OF STORM RUNOFF FROM A TEXAS BEEF FEEDLOT,
Abraham Baldwin Agricultural Coll., Tifton, Ga.
G. G. Wise, and D. L. Reddell.
Paper No 73-441 presented at 1973 Summer Meeting, American Society of Agricultural Engineers, University of Kentucky, Lexington, June 17-20, 1973. 23 p, 9 fig, 5 tab, 23 ref.

Descriptors: *Water quality, *Storm runoff, *Texas, *Cattle, *Feed lots, Measurement, Sampling, Drainage area, *Farm wastes, Path of pollutants, Water pollution sources.

A study of feed lot runoff was conducted fr nine months on a 10,000 head feed lot. Over 250 runoff samples were collected from 11 natural storms on two drainage areas. Approximately .5 inch of rainfall was generally required to initiate runoff. Relationships between volatile solids, total solids, and chemical oxygen demand were established. Storm pattern and size had little effect on the average concentration of a chemical element. Chemical oxygen demand, phosphorus, and Kjeldahl nitrogen followed the variations in total solids concentrations. Potassium, sodium, and chloride and filterable solids were not related to the sediment load. Most chemical constituents' concentrations were greater from area one than from area two, probably because of a greater slope at area one. (Frantz-East Central)
W75-04843

OXYGEN SAG AND STREAM PURIFICATION, (LITERATURE REVIEW),
Georgia Dept. of Natural Resources, Atlanta.
L. A. Neal.
Journal of the Water Pollution Control Federation, Vol 46, No 6, p 1413-1418, June, 1974. 56 ref.

Descriptors: *Aeration, *Oxygen sag, *Stream purification, Photosynthesis, Nitrification, Stochastic processes, Estuaries, Runoff, Reaeration, Biochemical oxygen demand, *Reviews, *Bibliographies, Dissolved oxygen.
Identifiers: Benthic deposits, Dissolved oxygen models.

An extensive bibliography of U.S. and foreign literature on the aeration of natural waters was compiled. A generalized model including the effects of photosynthesis and nitrification was developed. Sornberger and Keshaven produced a stochastic DO simulation under constant and variable temperature conditions, comparing the range of probable DO concentrations against mean values from a deterministic model. A stochastic DO model for streams and estuaries was developed by Schofield and Krutchkoff and predicted values were compared against data from the Ohio River and the Potomac estuary. The method of moments, Reed-Theriault, Thomas slope, and log differences were used in estimating BOD data. Bochinski investigated the merits of the TOD test in using non-biological techniques for estimating BOD, and presented correlations to TOD to COD and TOD to BOD. The results of direct reaeration capacity measurements, employing a radioactive tracer gas for oxygen, and associated hydraulic properties in five rivers were presented by Wallace and Tsivaglou. (Leibowitz-FIRL)
W75-04849

5C. Effects Of Pollution

THE EFFECT OF TEMPERATURE AND CHEMICAL POLLUTANTS ON THE BEHAVIOR OF SEVERAL ESTURINE ORGANISMS,
Ichthyological Associates, Inc., Middletown, Del.
J. W. Meldrim, J. J. Gift, and B. R. Petrosky.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 347, $5.75 in paper copy, $2.25 in microfiche. Bulletin No 11, December 1974. 129 p, 17 fig, 57 tab, 31 ref. OWRT C-3041(No 3677)(1).

Descriptors: *Fish behavior, *Water pollution effects, *Delaware River, *Metabolism, *Thermal pollution, *Chlorine, *White perch, *Silversides, *Brackish-water fish, Striped Bass, Killifishes, Marine fish, Crabs, Fish physiology, Water temperature, Chemical wastes, Salinity, Dissolved oxygen, Light intensity, Regression analysis, Estuaries, Nuclear powerplants, Bioassay, Analytical techniques.
Identifiers: *Temperature avoidance, *Chemical avoidance, Scope for activity, Fish swimming speed, Hogchoker, Grass shrimp, Blue crabs, Sand shrimp, Hypochlorimeter.

The increased use of estuarine waters for cooling purposes by steam electric generating stations requires that responses of affected fishes and macroinvertebrates to temperature and to the antifouling chemical, chlorine, be known. Behavioral avoidance responses to temperature and to chlorine were determined under various combined conditions of salinity, light level, and level of dissolved oxygen over the annual range of temperatures found in the Delaware River estuary. Physiological responses in terms of metabolic rate and scope for activity were determined for different levels of salinity over the same annual range of estuarine temperatures. Multiple regression analysis was used to estimate avoidance temperatures, concentrations of chlorine which would be avoided, and active and resting metabolic rates. Acclimation temperature was the dominant factor influencing the response level in all these studies. However, the effects of the other variables under study significantly affected the response as well as the effect of acclimation temperature. Further, these variables were found to interact such that the effects of the individual variables were not consistent. In several cases, these interactions were more important in determining the response level than the main effects of their components. Data and graphs showing these effects are presented.
W75-04353

ROOKERY BAY: ECOLOGICAL CONSTRAINTS ON COASTAL DEVELOPMENT,
Conservation Foundation, Washington, D.C.
J. Clark.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 349, $5.25 in paper copy, $2.25 in microfiche. Partial Completion Report - Rookery Bay Land Use Studies, December 1974. 91 p, 17 fig, 9 tab, 34 ref. OWRT C-4022(No 9004)(5), C-1817(No 3170)(5), C-2201(No 3385)(5).

Descriptors: *Water pollution effects, *Water pollution sources, *Estuaries, *Water quality control, *Estuarine resources, *Planning, *Coasts, Management, *Flood protection, Wetlands, Zoning, Mangrove swamps, Legislation, Sediments, Eutrophication, Water circulation, Salinity, Turbidity, *Florida, Land use, Urban runoff, Surface drainage, Ecosystems.
Identifiers: Critical area protection., Land use constraints, Development standards, Ecosystem protection, Ecologically vital areas, Socioeconomics, *Rookery Bay(Fla).

A coastal ecosystem was identified and analyzed to determine the needs and possibilities for protective management through controlling human activities which would adversely affect its natural drainage system estuarine resources. Three years of monthly sampling of the estuarine biota, and water chemistry, and continuous monitoring of tides and circulation, provided the basis for a detailed description of estuarine resources and amanagement diagnosis of its condition. Watershed vegetation, soils, and hydrology were surveyed. From this data base requirements for protection of the water system estuarine resources were determined. Social, economic, and land use surveys provided the basis for recommending a management plan consisting of: A system of identification of all water areas by use of vegetative indicators; specific development standards restricting water areas to light duty recreation use; contingency standards for low density residential development of water areas that cannot be

restricted to light recreational use; a plan for a 100,000-acre protected natural estuarine corridor for recreation and resource protection, and controls on land clearing and site preparation in the watershed. The management program is integrated with provisions of the Federal Flood Disaster Protection Act of 1973.
W75-04354

ECOLOGICAL HISTORY OF DDT IN ARIZONA,
Arizona Univ., Tucson.
G. W. Ware.
Journal of the Arizona Academy of Science, Vol 9, No 2, p 61-65, June 1974. 6 tab, 1 fig, 14 ref.

Descriptors: *DDT, *Agricultural chemicals, *Pesticides, *Arizona, Irrigation, Ecology, History, Agronomic crops, Insecticides, Pesticide residues.

DDT first appeared in Arizona in 1943, for experimental purposes. Beginning in 1946 and for the next 20 years it was used primarily on cotton and vegetable crops at the rate of 1 to 3 pounds per acre. The estimated use on irrigated agricultural crops in 1959-60 was 4 million pounds annually. In 1964, due to hay and milk contamination the use of DDT was restricted to spray application. Failure to reduce the milk and beef contamination problem caused a moratorium to be placed on the agricultural use of DDT by the U.S. Food and Drug Administration in 1969. This made Arizona the first state to have such a ban. The moratorium was repeated in 1970, 1971, and 1972 until 1973 when the cancellation of all DDT uses in 1973 by the Environmental Protection Agency resulted in a nationwide ban. (Mastic-Arizona)
W75-04387

DOSE-RATE EFFECT ON LIFE SHORTENING IN MICE,
Los Alamos Scientific Lab., N. Mex.
J. F. Spalding, O. S. Johnson, R. F. Archuleta, and G. L. Tietjen.
Available from NTIS, Springfield, Va 22161 as Rept. No. LA-5722-MS, $4.00 in paper copy, $2.25 in microfiche. Report No. LA-5722-MS, September 1974. 5 p, 4 fig, 2 tab, 21 ref.

Descriptors: *Radioactivity, *Radioisotopes, *Radiation effects, Animal physiology, *Age, *Longevity, Laboratory animals, Biology, Environmental effects, Public health.
Identifiers: *Mice, *Dose-rate.

An adult population of strain RF female mice were conditioned with 13 discrete doses of cobalt-60 gamma rays ranging from 457 to 3455 rad given at a dose rate of 2.76 rad/h. Median after-survival times of conditioned groups were compared with control nonconditioned groups to determine life-shortening effects of gamma rays given at a relatively low dose rate. No linear dependence of life shortening on dose was observed. The average life shortening for all conditioning doses used was 83 days (0.04 day/rad). The relatively small life-shortening effects observed were attributed to several factors, including age at exposure and dose rate, and not to dose rate alone. (Houser-ORNL)
W75-04398

PACIFIC NORTHWEST LABORATORY ANNUAL REPORT FOR 1973 TO THE USAEC DIVISION OF BIOMEDICAL AND ENVIRONMENTAL RESEARCH PART 4. PHYSICAL AND ANALYTICAL SCIENCES,
Battelle-Pacific Northwest Labs., Richland, Wash.
J. M. Nielsen.
Available from NTIS, Springfield, Va 22161 as Rept. No. BNWL-1850 Part 4, $5.45 in paper copy, $2.25 in microfiche. Report No. BNWL-1850, Part 4, February 1974. 128 p, 46 fig, 6 tab, 59 ref.

Descriptors: *Pollutant identification, *Research and development, *Environment, *Physical properties, *Analytical techniques, Technology, Instrumentation, Physicochemical properties, Physics, Radioisotopes, Radiochemical analysis, Transport, Radioactive tracers, Absorption.
Identifiers: Biophysics, *Population exposure, *Radiation exposure.

Described are programs in instrumentation technology which cover radiological chemical methods and instrument development and studies and the development of nuclear techniques for application to medical studies; programs in radiological and chemical physics which include radiation physics, radiation biophysics and radiation dosimetric research; studies related to the development of nuclear powered prostheses and the medical uses of isotopes; and research on the artificial heart. (See W75-04411 thru W75-04420) (Houser-ORNL)
W75-04410

RADIATION INSTRUMENTATION - RADIOLOGICAL CHEMISTRY,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5A.
W75-04411

NUCLEAR TECHNIQUES IN MEDICAL SCIENCE,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5A.
W75-04412

RADIATION PHYSICS,
Battelle-Pacific Northwest Labs., Richland, Wash.
L. H. Toburen, W. E. Wilson, L. Porter, S. T. Manson, and H. G. Paretzke.
In: Report BNWL-1850, Part 4, p 41-53, February 1974. 9 fig, 44 ref.

Descriptors: *Research and development, *Radiation, Physics, *Radioactive effects, *Biology, Materials, Ions, Ionization, Biological control, Biochemistry, Transport, Theoretical analysis, Evaluation, Prototype tests, Model studies, Speciation.
Identifiers: *Electrons.

The radiation physics program addresses three major research problems associated with understanding the effects of radiation on materials of biological significance. Electron emission from atoms and molecules bombarded by protons is studied to provide information on the primary collision processes. This information is then used to formulate descriptions of track structure and the interaction of ionizing tracks with volumes of biological and biochemical importance. Finally, the mechanism of energy transport and transformation from the energetic initial processes into chemical species is studied using time resolved luminescence. Electron emission cross sections have been improved for the very important low-energy electrons ejected from several gas targets. Theoretical studies of the angular distribution of ejected electrons have continued with a marked improvement for the lower energy electrons. Monte Carlo calculations of track structure and microdosimetric parameters have been started and the results are proving useful in formulating better initial conditions for the distribution of active species. This will permit development of more realistic models for radioluminescence. (See also W75-04410) (Houser-ORNL)
W75-04413

RADIATION DOSIMETRY,
Battelle-Pacific Northwest Labs., Richland, Wash.
W. C. Roesch, and L. A. Braby.
In: Report No BNWL-1850, Part 4, p 55-69, February 1974. 11 fig, 48 ref.

Descriptors: *Research and development, *Radiation, *Radioactivity, *Measurement, *Assay, Radioactivity effects, Environmental effects, Biology, Theoretical analysis, Statistics, Nuclear energy, Physics, Biology, Biochemistry.
Identifiers: *Dosimetry, Dose rate, Dosimetric parameters.

The development of an understanding of radiation effects on living systems at the cellular level continues to be the objective of the Radiation Dosimetry program. The emphasis is on the theoretical development and experimental realization and measurement of those physical parameters that appear appropriate for describing radiation effects. The major theoretical thrust has been on expanding the statistical theory to (1) more adequately incorporate dose rate and recovery effects, (2) examine the applicability of microdosimetric parameters, and (3) accommodate sublethal effects. This theory is then applied to a variety of published experimental radiobiological data to demonstrate its effectiveness in correlating the data. The microscopic distribution of energy in an irradiated absorber continues as an active topic of theoretical and experimental investigation. The major experimental effort, however, has been directed toward bringing to fruition a wide range of irradiation facilities for use in the Radiation Biophysics program. Facilities now provide the capability of irradiating cell monolayers and tissue culture with pulsed, monoenergetic protons, electrons, and filtered 330 kVp x rays. A wide range of dose rate, LET, and dose fractionation are now available with well-documented dosimetric parameters. (See also W75-04410) (Houser-ORNL)
W75-04414

RADIATION BIOPHYSICS,
Battelle-Pacific Northwest Labs., Richland, Wash.
W. C. Roesch, M. H. Schneiderman, L. A. Brady, and D. S. Nachtwey.
In: Report No BNWL-1850, Part 4, p 71-83, February 1974. 8 fig, 1 tab, 48 ref.

Descriptors: *Research and development, *Radiation, *Radioactivity effects, *Environmental effects, Biology, *Biological control, Biochemistry, Mammals, Nuclear energy, Cytological studies, Theoretical analysis, Mathematics, Model studies, Analytical techniques, Technology.
Identifiers: *Dosimetry, *Mutations.

In an effort to understand the effects of radiation on biological systems at the cellular level, two systems were chosen to study at sublethal radiation levels. The CHO is a mammalian cell line amenable to detailed investigation of radiation-induced division delay and radiosensitivity changes near the end of the cell cycle. Theoretical effort has been on mathematically describing the progression of cultured cells through the division cycle and formulating plausible models to account for the biochemical processes that are perturbed by radiation. The experimental emphasis has been in carefully selecting and characterizing the cell line to be used throughout the course of these collaborative experiments. Tissue culture techniques have also been perfected that will allow irradiation under the physically well-defined beams of monoenergetic protons and electrons. A second biological system, the single celled organism Chlamydomonas reinhardi, is being studied with particular attention being directed to its unique mutagenic behavior. Close coordination of experimental design, including dosimetric and biological considerations, and theoretical interpretation continue to be of central importance in this program. (See also W75-04410) (Houser-ORNL)
W75-04415

NUCLEAR POWERED PROSTHESES - BIOLOGICAL EFFECTS OF INTRA-CORPOREAL RADIOISOTOPE HEAT SOURCES,
Battelle-Pacific Northwest Labs., Richland, Wash.
M. F. Gillis, J. R. Decker, J. M. Creer, R. D. Carmichael, and N. R. Gordon.
In: Report No BNWL-1850, Part 4, p 85-88, February 1974. 2 fig, 5 ref.

Descriptors: *Research and development, *Biology, Mammals, *Hogs, *Nuclear energy, *Heat, *Radioactivity effect, Bioassay, Laboratory animals, Analytical techniques, Bioindicators, Technology, Heat exchanger, Heat transfer, Cytological studies.
Identifiers: Miniature swine.

A 50-watt intrathoracic 238Pul602 heat source in a miniature swine produced no clinical signs of untoward effect over a period of almost 10 months, in spite of aortic occlusion and burnup some time prior to sacrifice. Retroperitoneal abdominal implant experiments indicate surface heat flux tolerance limits of less than 0.01 watts/cm sq immediately postoperatively, increasing to nearly 0.04 watts/cm sq within one month, exploiting surface tissue ingrowth techniques. A miniature swine continues on experiment with a 29-watt 238Pul602 heat source implanted retroperitoneally in a discoid aluminum container with a velour fabric coat. (See also W75-04410) (Houser-ORNL)
W75-04416

MEDICAL USES OF ISOTOPES,
Battelle-Pacific Northwest Labs., Richland, Wash.
F. P. Hungate, D. H. Lester, W. F. Riemath, L. R. Bunnell, and M. F. Gillis.
In: Report No BNWL-1850, Part 4, p 89-96, February 1974. 7 fig, 5 ref.

Descriptors: *Research and development, *Human pathology, *Diseases, *Toxicity, Mammals, Biology, Radioactivity effects, Bioindicators, Radioisotopes, Public health, Thulium, Strontium, Yttrium.
Identifiers: Dogs, *Clinical diagnosis.

An inexpensive portable blood irradiator for clinical use in suppressing circulating lymphocytes and organ graft rejection and a generator for Nitrogen-13 (T 1/2 = 10 min) suitable for clinical diagnosis are two applications for isotopes being investigated under this program. A new approach to blood irradiation has been developed using Thulium-170 cast as an integral part of a vitreous carbon body. Production of the irradiators does not involve personnel exposures since the 169Tm used is neutron activated after manufacture. Reactivation is anticipated as units lose effectiveness with the 125-day half-life of 170Tm. Total weight of units applicable to clinical practice is anticipated to be less than 1 kg. An irradiator using Stronium-90-Yttrium-90 was also constructed and tested in a dog. Alpha irradiation of Boron-10 is the basic route being investigated for the 13N hospital generator. Both 13N2 and 13NH3 have potential value as diagnostic pharmaceuticals. (See also W75-04410) (Houser-ORNL)
W75-04417

MEDICAL GRADE PLUTONIUM-238 FROM AMERICIUM-241,
Battelle-Pacific Northwest Labs., Richland, Wash.
R. W. McKee.
In: Report No BNWL-1850, Part 4, p 97-98, February 1974.

Descriptors: *Research and development, *Radioisotopes, *Public health, *Evaluation, Safety, Plutonium, Americium, Economics, Fuel, Waste treatment, Biology, Bioindicators.
Identifiers: *Dosimetry, Clinical dosimetry, Therapy, Irradiation.

The objective is to compare and evaluate the relative economics and technical practicability of various approaches to producing both high-quality (low Pu-236 content) and high-purity (low dilution from other plutonium isotopes) Pu-238 by irradiating Am-241 recovered from spent power reactor fuel. The scope of the program includes (1) projecting the availability of Am-241, (2) identifying the process facilities required for americium recovery, and (3) identifying the optimum target irradiation and processing cycle. (See also W75-04410) (Houser-ORNL)
W75-04418

RECIPIENT RADIATION EXPOSURE - CIRCULATORY SUPPORT SYSTEMS,
Battelle-Pacific Northwest Labs., Richland, Wash.
F. T. Cross.
In: Report No BNWL-1850, Part 4, p 99, February 1974.

Descriptors: *Research and development, *Model studies, *Radioisotopes, *Heat, Radioactivity effects, Public health, Mammal, Bioindicators, Biology, Heat exchangers, Design criteria.
Identifiers: *Circulatory system, *Heat sources, Dose rates.

The objectives are to determine the dose from radioisotopic heat sources suitable for circulatory support systems and to develop radioisotopic heat source holders and shams for use in an animal study to assess the combined effects of heat and radiation from implanted plutonium heat sources. Improved input data and an ancillary code developed for specification of source strength and spectra have been used in parametric computations of dose rates to organ systems and whole body. Conceptual designs of heat source holders for abdominal implantation of heat sources have been completed. (See also W75-04410) (Houser-ORNL)
W75-04419

POPULATION RADIATION EXPOSURE,
Battelle-Pacific Northwest Labs., Richland, Wash.
R. W. McKee.
In: Report No BNWL-1850, Part 4, p 101-104, February 1974.

Descriptors: *Research and development, *Nuclear energy, *Beneficial use, *Public health, *Human population, Radioisotopes, Radioactivity effects, Bioassay, Evaluation, Safety, Surveys, Biology, Genetics, Data collections, Census.
Identifiers: *Dose, *Artificial heart recipients, Somatic effects.

The objective is to develop reliable estimates of the radiation doses to the population that would result from successful development and routine use of Pu-238 fueled artificial hearts. At the beginning of 1973, preliminary calcualtions indicated the most significant component of dose was that transmitted to spouses. Because the age and sex of persons exposed are critical factors in developing estimates of possible genetic or somatic effects, the objectives of the study were broadened to develop greater definition of the age and sex of persons potentially exposed. An extensive survey to collect required interpersonal distance data was carried out in the Salt Lake City area. To obtain required detailed descriptions of the household characteristics of potential artificial heart recipients, copies of the data tapes from the March 1972 Current Population Survey program were obtained from the Census Bureau, and a special computer program was written to process these tapes. At year end, the principal effort was being devoted to the computer program to carry out the detailed dose calculations and summations. (See also W75-04410) (Houser-ORNL)
W75-04420

BIOLOGIC DETECTION AND CONTROL OF WATER POLLUTION,
Clemson Univ., S. C. Dept. of Microbiology.
R. K. Guthrie, R. N. Ferebee, and D. S. Cherry.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 239 412, $3.75 paper copy, $2.25 microfiche. South Carolina Water Resources Research Institute, Clemson, Report No 40, April 1974. 39 p, 8 fig, 7 tab, 13 ref. OWRT A-022-SC (8).

Descriptors: Freshwater, *Bacteria, Herbicides, *Biocontrol, *Dissolved oxygen, Water temperature, *South Carolina, *Thermal pollution, Lakes, Water pollution effects, Bioindicators.
Identifiers: Bacterial populations, Thermal loading, Ambient temperatures, Bacterial diversity, Chromagenic bacterial populations, Lake Hartwell(SC), Lake Keowee(SC).

Dissolved oxygen, temperature and natural bacterial populations were determined in four systems at monthly intervals in terms of total plate counts, nutritional types, proportion of chromagenic bacteria, and number of colony types, for a period of one or two years and data were analyzed on a seasonal basis. The effects of thermal addition and chemical addition (herbicide pollution) were studied in various systems. In Lake Hartwell, S. C., total bacterial counts showed that seasonal cycles occur; highest counts were observed in the warmer months. Bacterial diversity and percent chromagens varied with seasonal temperatures. No detectable seasonal cycle in total plate counts was observed in Lake Keowee; high and low counts occurred randomly at various times during the year. In fast flowing aquatic systems at Savannah River Project, seasonal cycles were observed in all systems; highest counts were detected during warmer months. Bacterial diversity and percent chromagens varied with temperatures. Of three herbicides tested, one resulted in increased total populations, one did not significantly alter bacterial populations, and the third resulted in significant decreases in total populations. Effects of thermal addition on bacterial populations varied according to the nature of the aquatic system, the generic composition present, and the degree of thermal addition in relation to ambient temperatures.
W75-04447

INTERRELATIONS BETWEEN SULFATE-REDUCING AND METHANE-PRODUCING BACTERIA IN BOTTOM DEPOSITS OF A FRESH-WATER LAKE. I. FIELD OBSERVATIONS,
Hydrobiologisch Institutt, Nieuwersluis (Netherlands).
T. Cappenberg.
Antonie van Leeuwenhoek, Vol 40, No 2, p 285-295, 1974. 3 fig, 2 tab, 28 ref.

Descriptors: *Bacteria, *Methane bacteria, *Sulfate-reducing bacteria, Freshwater bacteria, Water pollution sources, Water pollution, Sand pits, Methane, Redox potential.
Identifiers: *Acetate, *Seepage, *Lake Vechten(Netherlands).

Observations on the seasonal periodicity in the bottom deposits of Lake Vechten indicate that an ecological relationship exists between the methane-producing and the sulfate-reducing bacteria. The sulfate-reducing bacteria are most abundant at depths of 0 to 2 cm in the mud at hydrogen sulfide potential values around 11 and redox potential values between 100 and 150 mV. The methane-producing bacteria are most abundant at depths of 3 to 6 cm and at hydrogen sulfide potential values around 14 and redox potential values between 250 and 300 mV. During the summer stratification, the numbers of both groups of bacteria rose but the methane-producers increased much more than the sulfate-reducers. The abundance of the sulfate-reducers is limited by the sulfate concentration in the interstitial water of the mud. Methane-producers are at greater depths in

the mud than the sulfate-reducers and the concentration of hydrogen sulfide is less. It is concluded that the different locations of the bacterial groups may be due to sensitivity of the methane-producers to hydrogen sulfide. (See also W75-04470) (Orr-FIRL)
W75-04469

INTERRELATIONS BETWEEN SULFATE-REDUCING AND METHANE-PRODUCING BACTERIA IN BOTTOM DEPOSITS OF A FRESH-WATER LAKE. II. INHIBITION EXPERIMENTS,
Hydrobiologisch Institutt, Nieuwersluis (Netherlands).
T. Cappenberg.
Antonie van Leeuwenhoek, Vol 40, No 2, p 297-306, 1974. 3 fig, 1 tab, 21 ref.

Descriptors: *Bacteria, *Methane bacteria, *Sulfate-reducing bacteria, Freshwater bacteria, Aquatic bacteria, Aquatic bacteria, Inhibition, Methane, Water pollution sources, Water pollution effects, Lakes.
Identifiers: *Acetate, *Inhibition experiments, Lake Vechten(Netherlands), Methanogenesis, Lactate.

A possible substrate interrelationship between methane-producing and sulfate-reducing bacteria has been studied in bottom deposits of Lake Vechten. The inhibition of methanogenesis in mud samples by chlorine-containing analogues of methane resulted in an accumulation of acetate. Fluoroacetate reduced the concentration of methane by about 75 percent. If carbon tetrachloride was used, an accumulation of hydrogen gas was observed. These results indicate that acetate is the main precursor of methanogenesis in mud. After addition of beta-fluoroacetate, accumulated and H2S was no longer produced, which indicates that lactate is the main source of energy for sulfate reduction in mud. Simultaneously, the concentration of methane increased. This may be due to the lower concentration of H2S, which has a toxic effect on methanogenesis. Experiments with intact mud cores have provided evidence that the described phenomena occur also in situ. (See also W75-04469) (Orr-FIRL)
W75-04470

THE EFFECTS OF MERCURIC CHLORIDE UPON RESPIRATION IN CONGERIA LEUCOPHAETA,
Texas A and M Univ., College Station. Dept. of Biology.
P. Dorn.
Bulletin of Environmental Contamination and Toxicology, Vol 12, No 1, p 86-91, July, 1974. 2 fig, 2 tab, 10 ref.

Descriptors: *Mercury, *Respiration, *Water pollution effects, Water pollution sources, Statistical methods, *Texas.
Identifiers: *Congeria leucophaeta, Mercury pollution, Respiration rates, Galveston(Tex).

Mercury in the marine environment can alter the normal life functions of aquatic fauna. Respiration is one function that can be affected by mercury. The respiration rates of the bivalve, Congeria leucophaeata were measured in sublethal concentrations of mercuric chloride. Solutions containing 1.0, 0.1, 0.01, and 0.001 ppm mercury as mercuric chloride were sublethal for 48 hours of exposure. The respiration rate of C. leucophaeata rose with increasing mercury concentration. The results were statistically significant above 0.01 ppm. (Orr-FIRL)
W75-04472

PRODUCTION ECOLOGY OF TWO CARIBEAN MARINE ECOSYSTEMS: I. PHYSICAL ENVIRONMENT AND FAUNA,
Liverpool Univ., Port Erin (England). Dept. of Marine Biology.
R. R. C. Edwards.
Estuarine Coastal Mar Sce, Vol 1 , No 4, p 303-318, 1973. Illus.
Identifiers: Avoidance reaction(Fish), *Caribbean Sea, Diet, Econogy, *Ecosystems, Effluents, *Fauna, Fish diets, Marine, Mud, Physical environment, *Production, Sand, Weed, Water pollution effects.

A quantitative study was made of the invertebrate macrofauna and fish fauna of 2 shallow water ecosystems. One was in an inlet on a clean sand bottom (1) while the other was on a muddy bottom (2) near a discharge point for domestic effluent. The largest average biomass of littoral infauna of 2.894 g/m2 dry flesh weighr was found at (2) while the largest average biomass of sublittoral infauna of 5.839 g/m2 found at (1). Fish biomass was 5.048 g/m2 at (1) and 1.200 g/m2 at (2) suggesting an avoidance reaction to the contaminated water at the latter locality. Diets of demersal fish were predominantly benthic infauna at (1) and epifauna at (2), the latter being related to the presence of a prolific week fauna in the sublittoral. (See also W75-04480)= =Copyright 1974, Biological Abstracts, Inc.
W75-04479

PRODUCTION ECOLOGY OF TWO CARIBBEAN MARINE ECOSYSTEMS: II. METABOLISM AND ENERGY FLOW,
Liverpool Univ., Port Erin (England). Dept. of Marine Biology.
R. R. C. Edwards.
Estuarine Coastal Mar Sci, Vol 1, No 4, p 319-333, 1973, Illus.
Identifiers: Aerobic conditions, Algae, Caribbean Sea, *Ecology, *Ecosystems, Effluent, *Energy flow, Fish, Invertebrates, Marine, *Metabolism, Plankton, Primary production, Respiration, Water pollution effects.

Primary production and respiration of 2 marine ecosystems were studied by measuring changes in dissolved O2 levels. In 1 of the ecosystems, on a clean sand bottom, energy input from bethic primary production and planktonic sedimentation was fully utilized by the benthic communities (e.g. fish, invertebrates), the former contributing 62% and the latter 38% of input. In the other ecosystem, which received domestic effluent from a city, total energy input to the bottom was higher due to increased sedimentation and production of benthic macroalgae. About half of the input to this system was utilized in aerobic respiration, while the remainder entered the anaerobic system where deposition occurred. Growth, respiration and turnover rates are discussed together with estimates of ecological efficiencies. (See also W75-04479)--Copyright 1974, Biological Abstracts, Inc.
W75-04480

INTERNAL WAVES AS CAUSATIVE MECHANISMS OF ISLAND MASS EFFECTS,
Bellairs Research Inst., St. James (Barbados).
F. Sander.
Caribb J Sci, Vol 13, No 3/4, p 179-182, 1973. Illus.
Identifiers: Internal waves, *Island mass effects, *Nutrient exchange, Plankton, Productivity, Thermocline, Waves(Water), *Entrophication, *Oligotrophic seas, Water pollution effects.

Enrichment by land drainage and a nutrient exchange between benthos and overlying waters are generally regarded as the major causes of an 'island mass' effect in tropical oligotrophic seas. It is postulated that internal waves, which were shown to oscillate vertically over an island shelf in conjunction with high nutrient concentrations below the upper limit of the shallow water thermocline, may also act as a principal causative mechanism by which inshore island waters are enriched. This source of repeated enrichment operates to support increased plankton populations and productivity inshore indicative of an 'island mass' effect.--Copyright 1974, Biological Abstracts, Inc.
W75-04481

ABUNDANCE, DIVERSITY AND SEASONAL PATTERNS OF ESTUARINE FISH POPULATIONS,
Environmental Protection Agency, Washington, D.C. Office of Technical Analysis.
A. J. McErlean, S. G. O'Connor, J. A. Mihursky, and C. I. Gibson.
Estuarine Coastal Mar Sci Vol 1, No 1, p 19-36, 1973. Illus.
Identifiers: Abundance, Diversity patterns, Energy, *Estuarine environment, *Fish populations, *Maryland(Patuxent estuary), Sampling, *Seasonal patterns, Steam electrical powerplants, *Thermal pollution.

Fish populations of the middle Patuxent Estuary in Maryland were sampled over a 4-yr period with quarterly frequency using 3 sampling gears: haulseine, beam trawl and otter trawl. Data from each quarterly collection at 50 stations were examined using a 3-dimensional grid to check for possible effect due to a steam electrical generating station (s.e.s.). No marked s.e.s. effect was noted although occasional temporal shifts were noted. Trend analyses were performed for the number of species, number of individuals and several diversity indices. All analyses show strong seasonal cycles that are related to the nursery function of the estuary and to migratory activities. Regression lines fitted to the cyclic-trend patterns all show decreasing functions with time. These patterns suggest that a loss in diversity, as measured by these indices, had occurred. These changes are interpreted as being caused by a true loss of species in some cases and a shift in population structure in others. Possible explanations for the trends are examined and the implication of the trends are discussed. Should these trends continue, structural complexity of an already simple system will be reduced and increased amounts of energy may be diverted to dominant forms. The altered system, because of the loss of buffering capacity provided by alternate food web interconnections, may become subject to crashes and booms.--Copyright 1974, Biological Abstracts, Inc.
W75-04485

LITTORAL FISH POPULATIONS AFTER AN OIL TANKER DISASTER IN THE FINNISH SW ARCHIPELAGO,
Turku Univ. (Finland). Archipelago Research Inst.
J. Mankki, and J. Vauras.
Ann Zool Fenn Vol 11, No 2, p 120-126, 1974. Illus.
Identifiers: Disasters, Emulsifiers, *Finnish archipelago, *Fish populations, Gasterosteus-aculeatus, Growth rates, *Littoral, *Oil spills, Phoxinus-phoxinus, Pungitius-pungitius, Oil pollution.

Littoral fish populations of areas of the Baltic Sea affected by an oil spill from a tanker were examined 2 yr after the disaster occurred. The most frequent species were Phoxinus phoxinus (L.), Gasterosteus aculeatus (L.) and Pungitius pungitius (L.). The aim was to ascertain whether the oil, and the emulsifiers used to repel it, had had long-term effects on these species. The fish were caught with a beach seine in June and July, 1971. Their age, growth, condition factor and regression coefficient of log length on log weight were studied in several populations. No statistically significant differences were found between populations of 3 oil-polluted areas and a control area. The effects of oil and emulsifiers on the fish and the situation after the disaster are discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-04487

THE EFFECT OF SALINITY AND IONIC EQUILIBRIUM ON CONTAMINATION OF ARENICOLA MARINA L. (ANNELIDA:

POLYCHAETA) BY CESIUM-137, (IN FRENCH),
Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France). Service de Recherches Toxicologiques et Ecologiques.
C. Amiard-Triquet.
J Exp Mar Biol Ecol Vol 15, No 2, p 159-164, 1974.
Identifiers: Annelida, *Arenicola-marine, *Cesium-137, Coelomic, Contamination, Fluid, *Ionic equilibrium, Polychaeta, *Salinity, Sands, Food chains, Water pollution effects.

The fixation of 137Cs on fine sand with Arenicola increases when the salinity or the K content of water is decreased. The contamination of Arenicola by 137Cs was, therefore, higher than in normal sea water. The concentration factors for sea water diluted to 60% or with a K level of 50% were twice those for normal sea water, except for the coelimic fluid, the concentration factor of which remained constant. Several sssumptions can explain the process: a weaker competition between ions at the lower concentrations; substitution of K by Cs; parallel contribution of Cs and K in maintaining the internal environment more hypertonic than the external environment and contamination via the food chain in desalinated sea water.--Copyright 1974, Biological Abstracts, Inc.
W75-04489

INFLUENCE OF HEATED DISCHARGE WATERS FROM THE 'SKAWINA' ELECTRIC POWER STATION ON THE ICHTHYOFAUNA OF THE RIVERS SKAWINKA AND VISTULA,
P. Epler, and K. Bieniarz.
Acta Hydrobiol, Vol 15, No 3, p 331-339, 1973, Illus.
Identifiers: Alburnus-alburnus, Barbus-barbus, Electric powerplants, Fauna, *Heated discharge, Ichthyo, Leuciscus-cephalus, Leuciscus-leuciscus, Rivers, Seasonal, *Poland, Skawinka River, Vistula River, *Thermal pollution, Water pollution effects.

Investigations on the influence of heated waste waters discharged into the Skawinka and Vistula Rivers (Poland) showed that except in the hottest seasons of the year fish gather in the area of heated waters. In high water temperatures (20C and 28C for not heated and heated waters respectively) the total number of fish caught decreased. It was found that such species as Leuciscus cephalus (L.), Alburnus alburnus (L.), Barbus barbus (L.) and L. leuciscus (L.) are highly eurythermic.--Copyright 1974, Biological Abstracts, Inc.
W75-04491

THE EFFECT OF COOLING WATER DISCHARGES ON ZOOPLANKTON IN A BAY OF LAKE MALAREN,
Uppsala Univ. (Sweden). Inst. of Zoology.
M. Lanner, and B. Pejler.
Inst Freshwater Res Drottningholm Rep, 53, p 31-33, 1973, Illus.
Identifiers: Bays, *Cooling water discharges, Lakes, Plankton, *Polyarthra-remata, Sewage, *Sweden(Lake Malaren), Winter, *Zooplankton, *Thermal pollution, Water pollution effects.

A relatively high frequency of species, as well as individuals, was noted in the middle of winter (March 1972) in the inner part of Vasteras Bay (Sweden), which is affected by cooling water discharges from 2 power stations and by municipal sewage from the city of Vasteras. In a strip of open water in the ice just outside one of the power stations, where the temperature at some places exceeded +9C, a warmwater stenothermal rotifer occurred, Polyarthra remata, previously never found in the winter.--Copyright 1974, Biological Abstracts, Inc.
W75-04496

NITROGEN FIXATION (ACETYLENE REDUCTION) BY PHYTOPLANKTON IN GREEN BAY, LAKE MICHIGAN, IN RELATION TO NUTRIENT CONCENTRATIONS,
Illinois Univ., Urbana. Dept. of Botany.
L. N. Vanderhoef, C.-Y. Huang, R. Musil, and J. Williams.
Limnol Oceanogr, Vol 19, No 1, p 119-125, 1974, Illus.
Identifiers: *Acetylene reduction, Aphanizomenon-sp, Bays, Diatoms, Gloeotrichia-sp, *Green Bay(Wis), Growth, *Lake Michigan, Microcystis-sp, *Nitrogen fixation, Nutrients, Phosphates, *Phytoplankton.

N fixation (acetylene reduction) and the growth of blue-green algae (Aphanizomenon sp., Microcytis, sp., Gloeotrichia sp.) were studied in Green Bay (Lake Michigan) during summer 1972. Where concentrations of all nutrients were high Microcystis predominated. As combined N concentrations decreased Aphanizomenon increased. Aphanizomenon showed increasing C2H2-reducing efficiency as the NH4+ + NO3- concentration declined, but its standing crop decreased with declining P concentration. At 40 km from the Fox River diatoms were predominant. Increased algal growth and N fixation in 1972, as compared to 1971, correlated with higher phosphate concentrations. Almost half as much N was added to the bay by fixation as was delivered by the Fox River during the same period.--Copyright 1974, Biological Abstracts, Inc.
W75-04498

A NEW TECHNIQUE FOR THE STUDY OF EPIPHYTIC ALGAE,
Clayton Junior Coll., Morrow, Ga.
H. D. Brown.
Limnol Oceanogr, Vol 19, No 1, p 151-152, 1974.
Identifiers: *Algae, Colonization, *Epiphytic algae, Mayaca-aubleti, Scirpus-confervoides, Sphagnum-macrophyllum, Websteria-submersa, *Analytical techniques, *Macrophytes, Lakes.

Several species of aquatic macrophytes are capable of growing both submerged and as terrestrial plants near the shoreline of lakes (Scirpus confervoides (=Websteria submersa sensu Small), Mayaca aubleti Michx. and Sphagnum macrophyllum Bernh.). Rapid colonization by algal epiphytes follows submergence of the land form of these plants and can then be correlated with a definite period of time, whereas the time of attachment of communities on naturally growing macrophytes is unknown.--Copyright 1974, Biological Abstracts, Inc.
W75-04499

BENTHIC COMMUNITY RESPIRATION NEAR THE WOODS HOLE SEWAGE OUTFALL,
Woods Hole Oceanographic Institution, Mass.
K. L. Smith, Jr., Gilbert T. Rowe, and Jean Ann Nichols.
Estuarine Coastal Mar Sci, Vol 1, No 1, p 65-70, 1973, Illus.
Identifiers: Antibiotics, Bacteria, *Benthic community, Fauna, Flora, Formalin, *Massachusetts(Buzzards Bay), Oxygen, *Respiration, Sediment, *Sewage outfalls, Absorption, *Water pollution effects.

Effects of the Woods Hole, Massachusetts sewage outfall on the surrounding benthic community were examined. In situ O2 uptake measurements of the sediment were made before and after treatment with antibiotics and formalin. Total O2 consumption was 67.8 ml O2 m-2 h-1 of which 15.0 ml O2 m-2 h-1 was attributable to the chemical demand of the sediment. Community respiration was 52.8 ml O2 m-2 h-1 with bacterial respiration representing 34% of the biological demand. Total O2 uptake, chemical demand and bacterial respiration were significantly higher than values obtained in the control area in Buzzards Bay. Macrofaunal and meiofaunal-microfloral-microfaunal respiration were estimated from structural data and the literature. Utilization and accumulation organic enrichment is discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-04503

ON THE VULNERABILITY OF ECOSYSTEMS DISTURBED BY MAN,
California Univ., Berkeley. Lawrence Berkeley Lab.
J. Harte, and D. Levy.
Technical report, LBL-3214. October 1974. 30 p, 5 fig, 6 ref. (Presented: First International Congress of Ecology, The Hague, Netherlands, September, 1974).

Descriptors: *Ecosystems, *Model studies, Stability, *Environmental effects, Flow, *Energy, *Nutrients, Methodology, Trophic, Equations, Measurement, Optimization, Water quality.
Identifiers: *Liapunov direct method, Environmental quality, Perturbations, Feedback, Sensitivity, Diversity.

The Liapunov stability theory is applied to models of energy and nutrient flow in ecosystems. The domain of stability under non-infinitesimal perturbations is discussed and significant differences are pointed out between models with and without detritus-decomposer feedback loops. Possible practical implications are suggested. Speculations concerning the role of fluctuations in ecosystems and the possibility of determining successional trends from an optimization procedure are also discussed. It is shown that increasing the number of trophic levels generally has no effect on the size of the domain of asymptotic stability; the exception to this occurs if the food web is not pyramidal in shape but rectangular or inverted. The damage to the decomposers or the organic or inorganic nutrient pools in an ecosystem is a potential source of instability--greater perhaps than that arising from tampering with the more visible predator-prey components of the system. (Bell-Cornell)
W75-04521

COMPARATIVE PHOTOSYNTHETIC CAPACITIES OF INTERTIDAL ALGAE UNDER EXPOSED AND SUBMERGED CONDITIONS,
Stanford Univ., Pacific Grove, Calif. Hopkins Marine Station.
W. S. Johnson, A. Gigon, S. L. Gulmon, and H. A. Mooney.
Ecology. Vol 55, No 2, p 450-453. Illus. 1974.
Identifiers: *Algae(intertidal), *Photosynthesis, Desiccation, Endocladia-Muricata, Fucus-Distichus, Iridaea-Flaccida, Porphyra-Perforata, Prionitis-Lanceolata, Tidal, Ulva-Expansa, *Marine algae.

Photosynthetic rates were measured for 6 spp. of intertidal marine algae, in the air and submerged. Ulva expansa and Prionitis lanceolata, from the lower intertidal, show reduced photosynthetic capacity in air compared to submerged rates. In contrast, species from the middle and upper littoral (Iridaea flaccida, Porphyra perforata, Fucus distichus and Endocladia muricata) reached maximum photosynthesis after some degree of drying. For these latter species, photosynthetic rates can be 1.6-6.6 times greater in air than in water at the same illumination and temperature. Desiccation rates under natural conditions are slow enough that these algae are capable of continuing a high rate of photosynthetic activity for extended periods while exposed and may fix the bulk of their C at this time. The capacity of these algae for sustained photosynthesis in air vary according to their intertidal zonation. These relationships may be partially responsible for the vertical distribution of intertidal marine algae.--Copyright 1974, Biological Abstracts, Inc.
W75-04524

MICROBIOLOGICAL PRODUCTION OF GEOSMIN,
Rutgers - The State Univ., New Brunswick, N.J. Inst. of Microbiology.
For primary bibliographic entry see Field 5D.
W75-04561

ENVIRONMENTAL REQUIREMENTS AND POLLUTION TOLERANCE OF FRESHWATER DIATOMS,
Bowling Green State Univ., Ohio.
R. L. Lowe.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Environmental Protection Agency Cincinnati, Ohio, Report EPA-670/4-74-005, p 334, November 1974. 16 ref, 3 append. 1BA027 ROAP 05AEF; Task 12, R-802495.

Descriptors: Aquatic biology, Plankton, *Diatoms, Ecology, Algae, Water quality, Phytoplankton, *Bioindicators, Periphyton, *Lethal limit, *Water pollution effects.
Identifiers: Pollution tolerance, Algal ecology.

Data on the environmental requirements and pollution tolerance of 300 common species and varieties of fresh water diatoms were compiled from 48 references. The following parameters were considered: pH, nutrients, salinity, organic pollution tolerance (saprobien system), current, general habitat, specific habitat, seasonal distribution, temperature and geographical distribution. A consensus of opinions for each parameter was established for most taxa. It is suggested that this compilation be employed to evaluate data from plankton and periphyton samples collected for the assessment of water quality. (See also W71-04210) (EPA)
W75-04563

MERCURY IN AQUATIC SYSTEMS: METHYLATION, OXIDATION-REDUCTION, AND BIOACCUMULATION,
Environmental Protection Agency, Athens, Ga. Southeast Environmental Research Lab.
For primary bibliographic entry see Field 5B.
W75-04570

BACTERIAL ZOOGLOEA FORMATION,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-04572

ACID-IRON WASTE AS A FACTOR AFFECTING THE DISTRIBUTION AND ABUNDANCE OF ZOOPLANKTON IN THE NEW YORK BIGHT: II. SPATIAL VARIATIONS IN THE FIELD AND IMPLICATIONS FOR MONITORING STUDIES,
Harvard Univ., Cambridge, Mass. Biological Labs.
For primary bibliographic entry see Field 5B.
W75-04574

SALMONELLA AND NATURAL PURIFICATION OF POLLUTED WATERS, (IN GERMAN),
L. Popp.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med. Vol 158, No 5, p 432-445. 1974 Illus.
Identifiers: Effluents, Fish, *Germany(Oker River), Infections, Rivers, *Salmonella, *Sewage treatment, Water purification, Water pollution effects, E. coli, *Self purification.

Along the river Oker (West Germany) a chain of control stations for water quality were instituted. All water samples were examined for the presence of salmonellae, for the number of Escherichia coli and for chemical data. An 18 mo. examination period is given, based on investigation of 826 water samples from the control stations and of 86 effluent samples from biological sewage treatment plants discharging into the main river and its tributaries; 55 types of salmonellae were isolated. The effluents of sewage plants contained 36 types of salmonellae, of which 32 also were found in the river. Numbers of isolated types of salmonellae and percentage of Salmonella-containing samples, the number of E. coli, the BOD and the flow volume at the control stations were recorded. Analogous data for effluents of sewage plants were presented. The results demonstrated the seasonal variations of Salmonella pollution. Semiquantitative examination for salmonellae at this control station were recorded. In spite of biological treatment of sewage and a high degree of dilution of effluents from the sewage treatment plants, considerable pollution by salmonellae was established. Effects of self purification were only seen during summer. Increasing flow elevated the percentage of Salmonella-containing samples but decreasing flow did not reduce the percentage. Consequently dilution cannot be considered an influence on Salmonella pollution. No dependence on BOD was observed. The epidemiological consequences of river pollutions by salmonellae were discussed. Attention was called to observations demonstrating that 64% of fishes caught in a polluted river were infected by salmonellae. The necessity of a reform of sewage treatment and sewage disposal was stressed.--Copyright 1974, Biological Abstracts, Inc.
W75-04578

MERCURY IN FOOD: A SCIENTIFIC STATUS SUMMARY BY THE INSTITUTE OF FOOD TECHNOLOGISTS' EXPERT PANEL ON FOOD SAFETY AND NUTRITION,
Institute of Food Technologists, Chicago, Ill. Expert Panel on Food Safety and Nutrition.
J Food Sci. Vol 38, No 4, p 1-6. 1973.
Identifiers: Epidemiology, Fish, Human diseases, Industrial, *Mercury, Microorganism, *Nutrition, Panel, Pollution, Safety, *Food safety.

Since Hg is ubiquitous, everyone consumes trace amounts. It can be found in all food and water, with higher concentrations in foods grown in areas having higher concentrations of Hg in soil. The short-chain alkyl Hg compounds, methyl, dimethyl and ethyl Hg, are more toxic than elemental Hg, inorganic salts of Hg and the aryl Hg compounds. Since Hg is excreted in feces, sweat exhaled breath, and urine, a daily intake of 1.0 mg/day of elemental Hg or inorganic Hg salts appears safe. The USA Department of Labor established an allowable level of 0.1 mg elemental Hg vapor or inorganic salts of Hg and 0.01 mg alkyl Hg per m3 of air for industrial exposures. The average USA diet contains less than 1/50 this amount. Epidemiological studies in several locations of elevated Hg content show no cases of methyl Hg poisoning resulting from fish consumption in the USA. The Food and Drug Administration does not allow the sale of fish containing more than 0.5 ppm (0.5 mg/kg) of Hg, and the canned tuna industry now includes Hg content as 1 of their quality specifications. The naturally occurring element, Hg, does not appear to pose a toxic hazard in the USA food supply; and there is no evidence that alkyl Hg formed by microorganisms in nature has led to methyl Hg poisoning. This does not imply there is no reason to control the release of elemental Hg and inorganic Hg salts into the environment from industrial operations. It does not indicate the problem has been recognized. Steps were taken to reduce discharges of elemental Hg and inorganic salts of Hg and to reduce or eliminate use of mercurials in agriculture providing an increasing margin of safety against the possibility of an excessive amount of Hg in any form finding its way into any portion of the USA food supply.--Copyright 1974, Biological Abstracts, Inc.
W75-04579

NUTRIENT ENRICHMENT OF GROUNDWATER FROM SEPTIC TANK DISPOSAL SYSTEMS,
Wisconsion Univ., Madison. Dept. of Geology and Geophysics.
J. G. Dudley, and D. A. Stephenson.
An Inland Lake Renewal and Shoreland Management Demonstration Project Report. November 1973. 131 p, 22 fig, 8 tab, 42 ref, 2 append.

Descriptors: *Ammonia, Nutrients, *Septic tanks, Water pollution sources, *Eutrophication, *Nitrogen compounds, *Phosphorus, Quality control, *Ground water, Recharge, Lake shores, Effluents, Sewage disposal, Nitrates, Lakes, Soils, Saturated flow.

Results of a literature review and field investigation of eleven septic systems of year-round dwellings near or on lakeshores document nutrient contributions of household septic disposal systems to ground water. Accumulations of nitrogen, ammonia, phosphorus, potassium and chloride were recorded. These varied with type of soils and water tables. Artificial recharge below absorption fields may result in local reversals of water table gradients and alterations in ground water flow patterns. In shoreland environments where under natural conditions lake water recharges the ground water, a local reversal could occur which would result in nutrient enriched ground water discharging to the lake. Large amounts of phosphorus may reach ground water at sites with well-drained, sandy soils where there is as much as 10 to 15 feet of unsaturated soil between the point of effluent release and the water table. Ground water samples taken with a bailer may have significant analytical bias. Proper location of observation wells is essential to ensure efficient monitoring of ground water quality. Additional research is needed to determine soil environmental factors which influence phosphorus migration and what physical and chemical transformations nitrogen species undergo in discharge areas. On lake shores where septic tank effluents may percolate into ground water which discharges to the lake large concentrations of phosphorus and nitrogen in nitrate form will promote large crops of algae and other aquatic plants. (Salzman-North Carolina)
W75-04758

AMELIORATION OF EFFECTS OF OIL SPILLS.
Council on Environmental Quality, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04779

THE EFFECTS OF THE INTERACTION OF OUTBOARD MOTORS WITH THE AQUATIC ENVIRONMENT: A REVIEW,
Southeastern Massachusetts Univ., North Dartmouth. Dept. of Civil Engineering.
T. P. Jackivicz, Jr., and L. N. Kuzminski.
Environ Res. Vol 6 No 4. p 436-454. Illus. 1973.
Identifiers: *Aquatic environment, Bluegill, Fathead minnows, Fish, *Motors(Outboard), Reproduction, *Reviews, Toxicity, *Water pollution effects, Biota.

The effects of the compounds associated with outboard motor subsurface exhausts on water quality and aquatic biota are reviewed. The problems affiliated with water quality may include the formation of undesirable tastes and odors and the appearance of oily substances. Outboard motor exhaust water can exhibit a toxic effect in sufficiently high concentrations to fathead minnows and bluegills, taints the flesh of various fish, and may affect the reproduction of fish. A discussion of the current research related to the effects of outboard motors on the aquatic environment is presented. Recommendations are given for future research to broaden the understanding of the interaction of outboard motors with the aquatic environment.--Copyright 1974, Biological Abstracts, Inc.

W75-04816

EFFECTS OF POLLUTION ON FRESHWATER FISH, (LITERATURE REVIEW),
National Water Quality Lab., Duluth, Minn.
J. M. McKim, G. M. Christensen, J. H. Tucker, D. A. Benoit, and M. J. Lewis.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1540-1590, June, 1974. 399 ref.

Descriptors: *Reviews, *Bibliography, *Biochemistry, *Water pollution effects, *Fish, Thermal pollution, Monitoring, Bioassay, Mercury, Tritium, Aquatic environments, Pesticides, Water quality, Methodology, Salinity, Herbicides, Industrial pollution, Piscicides, Pulp wastes, Domestic pollution.
Identifiers: Enforcement, Organochloride pesticides, Organophosphates, Cholinesterase, Alpha-Beta endosulfan.

Many books dealing with biological indicators, biochemical ecology, water quality, and management were published between 1972 and 1973. One treatise contained articles on thermal pollution, monitoring, and enforcement. Papers on various bioassay methods and water chemistry problems were compiled by Glass. The American Society for Testing and Materials listed 140 new biological and chemical methods. Instrumental analysis, automated chemical analysis, and data analysis were investigated. Mercury contamination of the environment dealing with occurrence, methods of analysis, environmental dynamics, and biological effects was studied by Hartung, Friberg and Vostal. Occurrence, dynamics, methods of minimizing persistent pesticides, and international control of such pesticides was researched by Edwards. The biological and environmental aspects of chlorinated insecticides, dealing with biochemistry and toxicity to nontarget organisms was explored by Brooks. The effects of pesticides on aquatic environments was the subject of several reviews, including those of McCaull, Pimentel, Mawdesley-Thomas and Fraser. (Leibowitz-FIRL)
W75-04848

5D. Waste Treatment Processes

CONTROL STRATEGY DEVELOPMENT STUDY, SAN FRANCISCO WASTEWATER MASTER PLAN,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
H. G. Wenzel, and B. H. Bradford.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 332, $5.75 in paper copy, $2.25 in microfiche. Metropolitan Water Intelligence Systems Report, July 1974. 138 p, 15 fig, 12 tab, 10 ref, 5 append. OWRT C-4172(No 9028).

Descriptors: *Combined sewers, Simulation analysis, *Control systems, *Sewers, *Storm runoff, *Overflow, *Optimization, Water pollution control, Operations research, Storage, Detention, Reservoir operation, Mathematical models, Algorithms, Systems engineering, Automatic contro., Computer programs.
Identifiers: Combined sewer systems, *Mathematical programming.

Using the 1971 San Francisco Master Plan for Wastewater Management as a data source, this report demonstrates the use of simulation and optimization to develop a control strategy for combined sewer detention basins operating under computer based automatic control. Results are presented which can be applied for the implementation of control strategy at the subbasin level. A basin in southwest San Francisco is used to demonstrate the operation of the strategy for real time control. A substantial amount of short term rainfall data as well as several computer programs, are included.

W75-04352

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED CLINTON POWER STATION UNITS 1 AND 2, ILLINOIS POWER COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04395

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF RIVER BEND NUCLEAR POWER STATION, UNITS 1 AND 2, GULF STATES UTILITIES COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04396

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED PILGRIM NUCLEAR POWER STATION UNIT 2 BOSTON EDISON COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04397

RETRIEVABLE SURFACE STORAGE FACILITY, ALTERNATIVE CONCEPTS ENGINEERING STUDIES.
Atlantic Richfield Hanford Co., Richland, Wash.
Available from NTIS, Springfield, Va 22161 as Rept. No. ARH-2888, $7.60 in paper copy, $2.25 in microfiche. Report No. ARH-2888 Rev., July 1974. 287 p, 75 fig, 35 tab, append. AEC AT(45-1)-2130.

Descriptors: *Waste storage, *Alternative water use, *Radioactivity, *Radioactive waste disposal, *Air pollution, *Water pollution, Nuclear powerplants, Fuels, Forecast, Prediction, Monitoring, Solid wastes, Heat transfer, Safety, Evaluation, Assessment, Public health, Environmental effects, Design criteria, Cooling, Convection.
Identifiers: *Fuel reprocessing.

The company is performing engineering studies under the Atomic Energy Commission's direction that will lead to the construction of a Retrievable Surface Storage Facility (RSSF), capable of receiving all high-level radioactive wastes generated by the commercial reactor fuel reprocessing plants through the year 2000 and storing these wastes under continued surveillance and maintenance. A period of 100 years is used as a design basis. The RSSF is assumed to be capable of receiving and storing approximately 75,000 canisters (1 foot diameter by 10 feet long) of dry solid waste containing a total of about 200 megawatts of heat. The functional requirements for the RSSF are the storage of these wastes in a safe manner that will (1) protect the health and safety of the public, and (2) have minimum adverse impact on man's environment. General design criteria have been developed and three basic storage concepts studied to provide a basis for choosing a preferred concept for the RSSF. These concepts are (1) storage in water basins, (2) storage in air-cooled vaults, and (3) storage in rugged, thick-wall casks. (Houser-ORNL)
W75-04401

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES.
Battelle-Pacific Northwest Labs., Richland, Wash.
Available from NTIS, Springfield, Va 22161 as BNWL-1900, Vol. 1, 2, 3, and 4, $10.60 in paper copy, $2.25 in microfiche. Report No. BNWL-1900, May 1974. 4 volumes, 1367 p, 275 fig, 165 tab, 826 ref, 40 append. Edited by K. J. Schneider and A. M. Platt.

Descriptors: *Alternative planning, Wastes, *Management, *Radioactive waste disposal, *Waste dilution, *Waste disposal, Waste disposal wells, Waste dumps, Waste identification, Waste storage, *Waste treatment, Regulation, Public health, Research and development, Nuclear energy, Alternative planning, Methodology.
Identifiers: *High-level wastes, Partitioning, Extraterrestrial, *Transmutations.

A comprehensive overview study is presented of potential alternative methods for long-term management of high-level radioactive wastes. The study includes a compilation of information relevant to technical feasibility, safety, cost, environmental considerations, policy conflicts, public response and research and development needs for: (1) Disposal in terrestrial locations -- In geologic settings on land; in the seabed; in ice sheets. (2) Disposal into space. (3) Elimination by transmutation. The study is limited to the management of high-level radioactive waste from nuclear power by variations of these alternatives. Disposal of waste in bedded salt deposits was studied extensively in other AEC programs, and the concept is included here as part of the overall matrix of geologic disposal techniques. To complement these studies, investigations were also conducted on waste partitioning, and systems methodology was developed to assess the effects of radionuclides from waste introduced into man's ecological cycle, assuming some failure of the primary waste containment. (See W75-04403 thru W75-04409) (Houser-ORNL)
W75-04402

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 1-3: SUMMARY, BACKGROUND AND DATA BASE, AND EVALUATION METHODOLOGY.
Battelle-Pacific Northwest Labs., Richland, Wash.
Available from NTIS, Springfield, Va 22161 as Rept. No. BNWL-1900, Vol. 1, $10.60 in paper copy, $2.25 in microfiche. Report No. BNWL-1900, Vol. 1, May 1974. 441 p, 42 fig, 48 tab, 131 ref, 16 append.

Descriptors: *Alternative planning, *Feasibility studies, *Management, *Wastes, *Administration, *Research and development, Technology, Environment, *Public health, Methodology, *Safety, Evaluation, Economics, Benefits, Cost-benefit theory, Cost-benefit analysis, *Waste treatment.

A summary is presented of a comprehensive overview study potential alternatives for long-term management of high-level radioactive waste. Described are the various waste management alternatives that have been studied and the methods being used for evaluation. The following investigation objectives for each waste management alternative is reported: (1) Technical Feasibility Information. (2) Safety Information and Methodology for Analysis. (3) Policy, Environment, and Public Response Considerations. (4) Advantages and Disadvantages. (5) Needed Research and Development. (6) Research and Development Costs. (7) Schedules and Capital and Operating Costs for Implementation. (See also W75-04402) (Houser-ORNL)
W75-04403

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 4: GEOLOGIC DISPOSAL.
Battelle-Pacific Northwest Labs., Richland, Wash.
Available from NTIS, Springfield, Va 22161 as Rept. No. BNWL-1900, Vol. 2, $7.60 in paper copy, $2.25 in microfiche. Report No. BNWL-1900, Vol. 2, May 1974. 231 p, 54 fig, 39 tab, 169 ref, 7 append.

Descriptors: *Alternative planning, *Management, Wastes, *Radioactivity, *Waste

disposal, *Geologic formations, *Waste treatment, *Waste storage, Transportation, Transport, Liquids, Solids, Gases, Environmental effects, Environmental control, Geology, Rocks, Bedrock, Soil, Stratigraphy, Geohydrology, Salts, Mining, Sodium compounds, Economics, Technology, Public health.

Discussed are the details of individual disposal concepts including a description of the concepts; waste management systems requirements beginning with discharge of high-level liquid waste from a plant reprocessing 'spent' nuclear fuel and ending with final waste emplacement in a geologic formation; concept related geologic considerations; technical feasibility; concept safety; research and development needs, including estimated costs; time required to commission, and estimated capital and operating costs associated with a facility for disposal of commercially generated radioactive waste; and policy, environmental, and public response considerations. (See also W75-04402) (Houser-ORNL)
W75-04404

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 5: ICE SHEET DISPOSAL,
Battelle-Pacific Northwest Labs., Richland, Wash.
D. D. Tillson, R. W. Wallace, J. R. Divine, and W. H. Swift.
Available from NTIS, Springfield, Va 22161 as Rept. No. BNWL-1900, Vol. 3, $7.60 in paper copy, $2.25 in microfiche. In: Report No. BNWL-1900, Vol. 3, May 1974. 199 p, 83 fig, 7 tab, 186 ref, 4 append.

Descriptors: *Alternative planning, Wastes, *Radioactivity, *Management, *Radioactive waste disposal, *Waste storage, *Transportation, *Ice, Sea ice, Firn, Ice jams, Melt water, Boats, Ships, Transfer, *Waste treatment, Sites, Technology, Geology, *Antarctic, Arctic.
Identifiers: Antarctica, *Greenland, Waste handling.

The concept for disposal of high-level radioactive waste in ice sheets, either Antarctica or Greenland, has been described previously in the literature. A copy of one of the latest proposals has been included as Appendix 5A. For this study a generalized schematic of the operations that would be required for waste management in ice sheets is shown. The basic operations consists of truck, rail or barge transport of solidified waste from a fuel reprocessing plant or interim retrievable surface storage facility to specialized embarkation ports; marine transport during 1 to 3 months of each year by specially designed ship, with ice-breaker escorts near the ice sheet; off-loading of the waste canisters at a debarkation facility near the edge of the continent; over-ice transport by surface vehicles on a year-round basis; and off-loading and emplacement at the disposal site. Disposal of the high-level waste would be by one of three concepts described as follows: (1) meltdown or free flow; (2) anchored emplacement; and (3) surface storage. (See also W75-04402) (Hourse-ORNL)
W75-04405

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 6: SEABED DISPOSAL,
Battelle-Pacific Northwest Labs., Richland, Wash.
D. D. Tillson, R. W. Wallace, J. R. Divine, W. H. Swift, and H. W. Lee.
Available from NTIS, Springfield, Va 22161 as Rept. No. BNWL-1900, Vol. 3, $7.60 in paper copy, $2.25 in microfiche. In: Report BNWL-1900, Vol. 3, May 1974. 104 p, 20 fig, 5 tab, 122 ref, 2 append.

Descriptors: *Alternative planning, Waste treatment, *Radioactive waste disposal, *Oceans, *Management, *Oceanography, *Marine geology, Sites, Sedimentation, Sedimentation rates, Sedimentary rocks, Environment, Safety, Solids, Transportation, Ships, Geology.
Identifiers: Seabed, Burial.

Some high-level radioactive wastes are managed by a system which features disposal in the seabed, generally in the deeper areas of the oceans. The various seabed areas studied were selected as representative of seabed areas which appear to have potential for long-term isolation of wastes. These areas include subduction zones--deep sea trenches, stable deep sea floor areas, and areas of relatively high sedimentation rates. In all cases, the waste is emplaced in the basement rock below the sediments to take advantage of remoteness from man, isolation from man's environment and high ion-exchange capacity of the sediments as backup protection. The management of the waste by these concepts consists of collection of previously solidified and canned wastes at specialized embarkation ports, transport by suitable ships to the seabed site and waste emplacement at the site from either a drilling ship or a semisubmersible drilling platform. Disposal is accomplished by the emplacement within the basement rock, and isolation is maintained by natural behavior within oceanic crustal layers after sealing of access/emplacement drill holes, or, in one concept, by further natural burial as a result of the geologic nature of the site. (See also W75-04402) (Houser-ORNL)
W75-04406

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 7: WASTE PARTITIONING,
Battelle-Pacific Northwest Labs., Richland, Wash.
J. W. Bartlett, R. E. Burns, L. A. Bray, L. L. Burger, and J. L. Ryan.
Available from NTIS, Springfield, Va 22161 as Rept. No. BNWL-1900, Vol. 4, $10.60 in paper copy, $2.25 in microfiche. In: Report No. BNWL-1900, Vol. 4, May 1974. 37 p, 3 fig, 1 tab, 14 ref.

Descriptors: *Radioactive waste disposal, *Management, *Alternative planning, Research and development, Radioisotopes, Degredation, Toxicity, *Waste storage, *Waste treatment.
Identifiers: *Waste partitioning.

An alternative approach in managing high-level radioactive waste involves separating the total waste into fractions of different half-lives. Short-lived fractions would then decay to become radioactively non-toxic in relatively short-times--times short enough to be within man's ability to control the waste storage. Long-lived fractions--significantly reduced in mass, volume and radioactive decay heat output--could be considered for other treatment, e.g., transmutation to non-radioactive or short-lived nuclides, extraterrestrial disposal, or special terrestrial disposal. (See also W75-04402) (Houser-ORNL)
W75-04407

HIGH-LEVEL RADIOACTIVITY WASTE MANAGEMENT ALTERNATIVES - SECTION 8: EXTRATERRESTRII DISPOSAL,
Battelle-Pacific Northwest Labs., Richland, Wash.
K. Drumheller, C. L. Brown, B. Griggs, R. E. Hyland, and J. S. Mackay.
Available from NTIS, Springfield, Va 22161 as Rept. No. BNWL-1900, Vol. 4, $10.60 in paper copy, $2.25 in microfiche. In: Report No. BNWL-1900, Vol. 4, May 1974. 204 p, 51 fig, 30 tab, 126 ref, 6 append.

Descriptors: *Alternative planning, *Radioactive waste disposal, *Waste treatment, *Transportation, Technology, Research and development, Solid wastes, Distance.
Identifiers: High-earth orbit, Spacecraft, *Extraterrestrial, Solar system escape, Encapsulation.

The basic concept of extraterrestrial disposal includes packaging waste materials in a safe manner and transporting the material by rocket or other means to a location off the earth. Several different trajectories have been considered. These include: (1) A high earth orbit on the order of 150,000 kilometers. (2) Transport to the sun. (3) A solar orbit other than that of the earth and planets. (4) Solar system escape. Vehicles used in the analysis as current technology include existing space vehicles and the planned space shuttle and tugs. (See also W75-04402) (Houser-ORNL)
W75-04408

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 9: TRANSMUTATION PROCESSING,
Battelle-Pacific Northwest Labs., Richland, Wash.
R. C. Liikala, J. B. Burnham, B. F. Gore, B. R. Leanord, Jr., and D. L. Lessor.
Available from NTIS, Springfield, Va 22161 as Rept. No. BNWL-1900, Vol. 4, $10.60 in paper copy, $2.25 in microfiche. In: Report No. BNWL-1900, Vol. 4, May 1974. 151 p, 22 fig, 35 tab, 78 ref, 5 append.

Descriptors: *Alternative planning, *Radioactive waste disposal, *Management, *Waste treatment, *Separation techniques, Radioisotopes, Toxicity, Toxins, Technology, Research and development, Nuclear explosions.
Identifiers: *Transmutation, Stable element, Reactor fission, Photon processes, Reactor fusion.

A possible approach to the management of radioactive waste is the use of nuclear processes themselves to change (transmute) the toxic long-lived radioactive constituents in high-level waste into short-lived radioactive or nonradioactive isotopes. Known processes which could potentially be used for transmuting toxic isotopes into nontoxic isotopes are described. The study is extensive enough to determine which fundamental processes are theoretically not possible in light of current technology. At the same time the study was not exhaustive in that little or no optimization of possible processes was attempted. Thus, initial conclusions of technical and/or economic infeasibility of transmutation should not dismiss future research entirely since it is the only method that has the potential for accelerating natural aging processes of eliminating waste. (See also W75-04402) (Houser-ORNL)
W75-04409

BIODEGRADABILITY OF A CARBOXYMETHYLOXYSUCCINATE DETERGENT BUILDER,
California Univ., Berkeley. Sanitary Engineering Research Lab.
S. A. Klein, and D. Jenkins.
Journal Water Pollution Control Federation, Vol 46, No 9, p 2107-2117, September, 1974. 10 fig, 4 tab, 7 ref.

Descriptors: *Detergents, Degradation(Decomposition), *Septic tanks, *Percolation, *Biological treatment, *Waste water treatment, Oxidation lagoons, *Biodegradation.
Identifiers: *Trisodium carboxymethyloxysuccinate.

Trisodium carboxymethyloxysuccinate (CMOS) is being used as a detergent builder that contains no phosphorus or nitrogen. The fate of CMOS during wastewater treatment by pilot scale septic tank-percolation field systems and oxidation ponds is discussed. Septic tanks with a two-day residence time are ineffective in removing CMOS; 10 percent CMOS removal was achieved by the septic tanks. CMOS degradation was essentially total in

aerobic percolation fields following septic tank treatment. CMOS degradation in excess of 90 percent was obtained in anaerobic percolation fields. The removal of CMOS is virtually complete when the dissolved oxygen of the percolation field effluent is one mg/liter. Algal oxidation ponds required an acclimation period of 150 days (about five times average hydraulic residence times) before significant CMOS removal occurred. The ponds receiving 30 mg/liter CMOS acclimated to CMOS slower and achieved lower levels of CMOS removal than ponds receiving CMOS levels of 15 mg/liter. (Orr-FIRL)
W75-04426

TRICKLING FILTRATION OF A WASTE CONTAINING NTA,
Iowa State Univ., Ames. Dept. of Civil Engineering.
J. L. Cleasby, D. W. Hubly, T. A. Ladd, and E. A. Schon.
Journal Water Pollution Control Federation, Vol 46, No 8, p 1873-1887, August, 1974. 8 fig, 4 tab, 20 ref.

Descriptors: *Trickling filters, *Nitrilotriacetic acid, *Detergents, Biochemical oxygen demand, Chemical oxygen demand, Nitrification, Heavy metals, *Waste water treatment, Filtration.

Interest is being shown in the use of the soidum salt of nitrilotraicetic acid (NTA) as a replacement compound for polyphosphate detergent builders. However, before NTA can be allowed to replace phosphates in the environment its ultimate fate as it goes through the waterways and waste treatment plants must be known. The effect of NTA on a trickling filter and the NTA-removal ability of the trickling filter are discussed. There was no effect on the efficiency of a trickling filter to remove BOD, COD, and TOC at NTA levels of 4, 8, and 16 mg/liter. Two to three weeks were needed at an NTA feed level of 4 mg/liter before substantially complete NTA removal occurred. NTA levels of less than 0.5 mg/liter were consistently reached at dosage levels of 4 and 8 mg/liter Na3NTA during the summer and fall. During cold weather operation, the NTA removal was less complete (less than 2 mg/liter in the effluent when the NTA level was 8 mg/liter). No functional relationships between NTA removal and the removal of other organic substances were observed. The NTA had no effect on nitrification efficiency or on the ability of the trickling filter to remove heavy metals. (Orr-FIRL)
W75-04427

FLUIDIZED-BED SLUDGE INCINERATOR DESIGN,
Kramer, Chin and Mayo, Seattle, Wash.
P. B. Liao.
Journal Water Pollution Control Federation, Vol 4, No 8, p 1895-1913, August, 1974. 6 fig, 3 tab, 22 ref.

Descriptors: *Sludge disposal, *Waste water treatment, *Incineration, Design, Ultimate disposal, Design criteria, *Pilot plants, Burning, Facilities.

Theories of fluidization and sludge combusion, methods for development of design criteria, equations, and procedures for design calculations for a fluidized-bed wastewater sludge incinerator are discussed. The design criteria and equations derived are the result of pilot plant operation. They can be used for prototype incinerator design. A design method is given which ranges from determining the amount and rate of sludge to be incinerated to determining the best air pollution control equipment. An incinerator can be designed by using the equations and the relationships between sludge loadings, air supply, and fuel requirements. Fluidized-bed treatment is a sanitary and efficient method of wastewater sludge disposal and has a minimum of detrimental effects on the environment. (Orr-FIRL)
W75-04428

GRANULAR FILTERS FOR TERTIARY WASTEWATER TREATMENT,
Iowa State Univ., Ames.
E. R. Baumann, and J. Y. C. Huang.
Journal Water Pollution Control Federation, Vol 46, No 8, p 1958-1973, August, 1974. 14 fig, 3 tab, 24 ref.

Descriptors: *Filters, *Filtration, *Tertiary treatment, Design criteria, *Pilot plants, Suspended solids, *Waste water treatment, *Iowa.
Identifiers: Dual-media filter.

A dual-media filter (coarse anthracite over finer sand) overcomes the problems of head loss across the filter and no penetration of the solids into the bed that are present when a normal, graded, single-medium filter is used to filter the suspended solids left after secondary treatment. A pilot plant was constructed and operated at the Ames, Iowa, Pollution Control Plant to test procedures to be used in the design of tertiary wastewater filters and to determine the effectiveness of granular filtration in reducing the pollution potential of the effluent from a water pollution control plant. The results showed that the final effluent from the control plant should be filtered through a dual-media filter with 38.10 cm of uni-sized 1.84 mm anthracite on top of 38.10 cm of uni-sized 0.55 mm sand. The filtrate suspended solids should be about 4 to 5 mg/liter, the filtration rate can be as high as 6 gpm/sq ft, and the influent suspended solids can be as high as 40 mg/liter. The following steps should be included in a design of a pilot plant operation to determine the optimum economic design of a tertiary filter plant: determination of the proper size and depth of anthracite and sand based on the particular type of wastewater; determination of the backwash rate required for the chosen media size and depth combination; development of curves relating the net water production to the filtration rate under different run lengths; and, development of the curves relating run length to the filtration rate at different suspended solids concentration. (Orr-FIRL)
W75-04429

COMPLYING WITH DISCHARGE REGULATIONS,
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W75-04431

1971 ANNUAL REVIEW OF LITERATURE. WASTE WATER TREATMENT PHYSICAL AND CHEMICAL METHODS,
National Environmental Research Center, Cincinnati, Ohio.
J. M. Cohen, and I. J. Kugelman.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 213 826, $3.25 paper copy, $2.25 microfiche. 1972. 22 p, 90 ref.

Descriptors: *Waste water treatment, *Reviews, Water clarification, Filtration, Phosphorus, Nirtogen, Flocculation, Sedimentation, Coagulation, Adsorption, Demineralization, Chemical control, Physical control, Water reclamation, *Bibliographies.
Identifiers: Physical-Chemical treatment, Phosphorus removal, Nitrogen removal.

A review of the literature of 1971 shows an increasing interest in using physical-chemical methods of wastewater treatment as practical alternatives to conventional biological methods. New views on the topics of water reclamation, phosphorus removal, nitrogen removal, adsorption, coagulation-flocculation-sedimentation, filtration, and demineralization are discussed with specific references to articles dealing with these subjects. (Orr-FIRL)
W75-04437

ELECTROCHEMICAL PROCESS FOR NUTRIENT REMOVAL,
Rhode Island Univ., Kingston. Dept. of Civil and Environmental Engineering.
C. P. C. Poon.
Available from the National Technical Information Service., Springfield, Va. 22161, as PB 239 415, $3.75 paper copy, $2.25 microfiche. Completion Report, (1974). 42 p. 10 fig, 7 tab, 8 ref.OWRT A-040-RI(2), 14-31-0001-3840.

Descriptors: *Waste water treatment, *Adsorption, Electrochemistry, *Chlorination, *Phosphates, Kinetics, Stratification, *Nitrogen, *Nutrient removal, Coliforms, Biochemical oxygen demand, Model studies.

A flow-through electrochemical process can be used for municipal or industrial wastewater treatment where seawater is easily accessible and ocean discharge of effluent (better than secondary effluent quality) is permitted. Because of its simplicity in construction and operation, the process is seen as a most promising candidate of future shipboard waste treatment for vessels of various sizes operating on saline water. The primary mechanism for phosphorous removal in the electrochemical process was adsorption onto Mg (OH)2 flocs; the adsorption process followed a Langmuir type isotherm kinetic. Breakpoint chlorination was primarily responsible for nitrogen removal from sewage. If there was a good stratification in a batch process and when the power supply was 4.5 kwh/1000 gallons of sewage, the process could remove in 60 minutes the following: P - 98%, N - 85%, BOD - 85%, SS-87% and Coliform - 100%. Tests using a flow-through model showed that efficiency of nutrients removal was improved significantly by increasing the sewage-seawater ratio.
W75-04446

NITROGEN MASS BALANCE DETERMINATION FOR SIMULATED WASTEWATER LAND-SPREADING OPERATIONS,
Texas Tech Univ., Lubbock. Water Resources Center.
R. M. Sweazy, S. W. Chapman, Jr., and D. M. Wells.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 239 406, $4.25 paper copy, $2.25 microfiche. Completion Report, December 1974. 44 p, 5 fig, 13 tab, 17 ref. OWRT A-026-TEX(1).

Descriptors: Texas, *Water reuse, Soils, Irrigation, *Sewage effluent, Nitrates, Nitrification, Nitrogen, Percolation, Groundwater, Water quality, Absorption.
Identifiers: *Nitrogen Mass Balance, Nitrogen Uptake, Sewage Farming, *Lubbock(TEX).

Treated sewage effluent from the City of Lubbock was applied to three soil bins filled with typical West Texas soil. The effluent added and the percolated effluent were analyzed to determine the various forms of nitrogen so that a mass balance could be determined, and the nitrate pollution potential of secondary effluent used for irrigation on the South Plains of Texas could be evaluated. The amount of effluent applied was approximately that applied in normal irrigation projects using secondary wastewaters. Results showed that irrigation with sewage effluent on the High Plains of Texas is a source of groundwater pollution. Selective crop production was determined to be the most effective method of protecting the groundwater from sewage irrigation provided loading rates are such that nitrogen uptake by the crop approximates the nitrogen applied in the sewage effluent.
W75-04449

APPARATUS FOR THE FILTRATION AND BIOLOGICAL PURIFICATION OF CONTAMINATED WATER,
A. Schreiber, E. Schreiber, and B. Schreiber.

U.S. Patent No 3,846,305, 6 p, 13 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 928, No 1, p 266, November 5, 1974.

Descriptors: *Patents, *Waste water treatment, *Filters, *Filtration, Water quality control, Pollution abatement, *Biological treatment, Water pollution, *Trickling filters.

An apparatus for the filtration and biological purification of contaminated water is disclosed. The apparatus has a trickling filter tank containing a wear-resisting filler material having a specific gravity of not greater than 1. The filler material is filled with flusing water for the purpose of freeing it. The mixture of filler material, sludge, water and additionally supplied flusing water, is displaced by agitation to discharge the greater part of the sludge in the form of a mixture of water and sludge. The flushing water mixed with sludge is thereafter discharged and the trickling filter tank is once again fed with contaminated water to be purified. (Sinha-OEIS)
W75-04454

SEWAGE TREATMENT SYSTEM,
G. A. Milne.
U.S. Patent No 3,859,215, 5 p, 3 fig, 17 ref; Official Gazette of the United States Patent Office, Vol 930, No 1, p 434, January 7, 1975.

Descriptors: *Patents, *Waste water treatment, *Sewage treatment, *Domestic wastes, *Aeration, Pollution abatement, Water pollution control, Underground structures, Sludge, Equipment.
Identifiers: Clarification, Tertiary treatment.

A sewage aeration tank is constructed as an elongated cylinder with a horizontal axis having a length to diameter ratio of greater than three to one. The large areation tank is completely closed and has openings tightly surrounding sewage inlet and effluent pipes, sludge return pipes, oxygenation pipes and vent pipes. The large aeration tank and its sewage inlet, grease and trash trap, clarifier, sludge return lines from the clarifier to the aeration tank, tertiary treatment tank and outflow apparatus are buried underground. A recreational space is provided on top of the system. An air blower is housed in an equipment room of an adjacent apartment unit which the system serves, and a vent extends upward from a roof of the apartment house. (Sinha-OEIS)
W75-04456

WATER CLARIFICATION WITH NITROGEN-HETEROCYCLIC PHOSPHONIC ACIDS,
Petrolite Corp., Wilmington, Del. (assignee).
D. Redmore.
U. S. Patent No 3,859,211, 15 p, 6 tab, 4 ref; Official Gazette of the United States Patent Office, Vol 930, No 1, p 432, January 7, 1975.

Descriptors: *Patents, *Waste water treatment, *Flocculation, Suspended solids, Corrosion control, Scaling, Aggregates.
Identifiers: *Chemical treatment, *Water clarification, Nitrogen heterocyclic phosphonic acids.

A process is disclosed for clarification of water by adding to water containing suspended matter, nitrogen heterocyclic phosphonic acids and derivatives. T They are characterized by aminomethyl (Or substituted methyl) phosphonic acids or derivatives thereof bonded directly or indirectly, i.e., through a N-side chain to the nigrogen atom in the heterocyclic ring. The addition of the compounds of this invention to the water suspension should be made in such a fashion that the resulting flocculation and aggregation of the particles takes place uniformly throughout the body of water. (Sinha-OEIS)
W75-04457

RECOVERY OF POTABLE WATER FROM SANITARY WASTE USING SOLID WASTES AND REFUSE AS A HEAT SOURCE,
F. W. Taylor.
U.S. Patent No 3,859,174, 7 p, 4 fig, 15 ref; Official Gazette of the United States Patent Office, Vol 930, No 1, p 421, January 7, 1975.

Descriptors: *Patents, Solid wastes, *Potable water, *Waste water treatment, *Evaporation, *Condensation, Water supply, Water purification, *Municipal water, Incineration, Heat exchanger, Gases, Water vapor.
Identifiers: *Sanitary wastes.

A process and apparatus for disposing of solid wastes, for disposing of sanitary waste waters, and for producing potable water, are disclosed. The solid wastes are incinerated and the heat generated during incineration is used to evaporate sanitary waste waters. Contaminated waters are first used as cooling water and then atomized into the gas stream coming from the incinerator to cool the combustion gases and evaporate the water in the contaminated water. Solids are removed from the gas stream, which also contains water vapors, and then the gases are cooled to condense the water vapors, which is suitable for use in a city water supply system. (Sinha-OEIS)
W75-04458

VERTICAL, MULTISTAGE-FLASH, FALLING FILM COLUMN FOR DISTILLING BRINE,
Societe General d'Entreprises, Paris (France). (assignee).
For primary bibliographic entry see Field 3A.
W75-04459

SELF-RECONDITIONING FILTER APPARATUS FOR CONTINUOUS REMOVAL OF SOLIDS FROM A STREAM OF LIQUID,
T. Hagihara.
U.S. Patent No3,856,678, 5 p, 6 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 929, No 4, p 1701, December 24, 1974.

Descriptors: *Patents, *Filters, *Filtration, *Solid wastes, *Waste water treatment, Pollution abatement, Water pollution control, Sea water, Industrial wastes, Equipment.
Identifiers: Self-reconditioning filters, Endless belts.

An imporved filter apparatus is capable of continuously arresting solids of various size and nature contained in a liquid flowing through a channel of given width and depth, carrying the arrested solids away from the flow of liquid and succeedingly casting them off. The filter apparatus includes a pair of toothed wheels mounted adjacent both ends of a shaft which is rotatably supported across the desired liquid channel adjacent its bottom. A second pair of toothed wheels similarly mounted on a second shaft are placed on the downstream side of the first shaft. A third pair of toothed wheels can likewise be mounted on a third shaft further on the downstream side in coplanar relationship to the others. A filter medium in the form of a flexible endless belt operates over the pairs of toothed wheels. As the filter turns over the third pair of toothed wheels, the hook portions of the filter units are caused to swing outwardly thereby casting off the solids which have been caught by the filter medium. (Sinha-OEIS)
W75-04460

CLOSED-LOOP OZONE GENERATING AND CONTACTING SYSTEM,
Grace, W. R. and Co., New York. (assignee).
H. Lee, and H. M. Rosen.
U.S. Patent No 3,856,671, 6 p, 2 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 929, No 4, p 1699, December 24, 1974.

Descriptors: *Patents, *Water purification, *Ozone, Oxygen, Gases, Nitrogen, Carbon dioxide, Water vapor, Waste water treatment.
Identifiers: *Fractionators, Closed-loop, Ozonator.

Water can be treated with ozone and/or oxygen in a closed-loop cycle, thus conserving the high oxygen content gas. The system comprises as a principal feature a pressure-swing fractionator which removes nitrogen, carbon dioxide and water vapor from a feed gas, producing an oxygen enriched gas which flows to a contactor or an ozonator. The oxygen enriched gas from the ozonator contains from about 1 to 7 percent ozone. This gas mixture, or solely an oxygen stream, is then contacted with water to be treated. Purified water is recovered, and excess oxygen and/or oxygen and enriched in nitrogen, forms a recycle gas which is combined with a charge of air and flowed to the pressure-swing fractionator to begin another cycle. The pressure-swing fractionator serves the dual simultaneous purpose of producing the necessary oxygen enriched gas for subsequent use and maintaining a low nitrogen level throughout the closed-loop. (Sinha-OEIS)
W75-04461

REMOVAL OF BORON FROM WATER,
Occidental Petroleum Corp., Los Angeles, Calif. (assignee).
W. D. Peterson.
*Patents, *Boron, Water treatment, *Ion exchange, Pollution abatement, *Sewage treatment, *Waste water treatment, Water pollution control, Resins, Phenols, Cations, Alkalis(Bases), Nitrogen, Ammonium compounds.
Identifiers: *Chemical treatment, Aldehydes, Alkaline earths.

A process is described for the removal of boron values from aqueous solutions containing borate ions. The aqueous solution is contacted with a water insoluble solid organic ion exchange resin. The resin is produced by the co-condensation of an aromatic ortho hydroxy carboxylic acid, a phenolic compound and an aldehyde to selectively absorb the boron value onto the resin in the presence of at least one cationic species selected from the group consisting of alkali, alkaline earth, nitrogen organic bases and ammonium cations. The cationic species can be incorporated into the resin during resin formation, or they can be incorporated into the resin by contacting the resin with a solution containing the desired species prior to utilizing the resin in the process. (Sinha-OEIS)
W75-04462

METHOD FOR TREATMENT OF COAL WASHERY WATERS,
R. H. Shubert.
U.S. Patent No 3,856,668, 6 p, 2 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 929, No 4, p 1698, December 24, 1974.

Descriptors: *Patents, *Waste water treatment, *Coal mine wastes, *Filtration, *Mine wastes, Pollution abatement, Suspended solids, Clays, Shales.
Identifiers: *Black water, Hydrocarbon oil, Agglomerates.

Waters containing finely divided coal and inorganic matter, such as are produced as a waste in coal washery plants, may be clarified and substantially freed of suspended solids using a two-step process in which coal particles are removed in the first step and inorganic mineral constituents are removed in a second step. Coal is removed in the first step by agglomerating the coal to form relatively large flocs or clumps. The agglomerates float on water in spite of the fact that the specific gravity of coal is substantially greater than that of water. Agglomeration is accomplised by treating the black water waste with a heavy hydrocarbon oil while subjecting the mixture to agitation of suf-

ficient intensity to coat the coal particles and to cause collisions between coated coal particles. Filtration through a relatively coarse medium such as a fine screen retains the coal agglomerates as a cake while passing the water and suspended mineral constituents. The water fraction is further treated preferably by settling, to produce a water stream substantially free of suspended matter. Coal agglomerates removed from the separation zone display a relatively low ash content and high calorific value since they contain essentially all of the hydrocarbons used in theagglomeration. The agglomerates dewater readily and may be dried and used as fuel. (Sinha-OEIS)
W75-04463

METHOD FOR ELECTROSANITIZING WASTE WATER,
Diamond Shamrock Corp., Cleveland, Ohio. (assignee).
D. F. Lieb, and N. W. Stillman.
U.S. Patent No 3,856,642, 4 p, 2 fig, 2 tab, 7 ref; Official Gazette of the United States Patent Office, Vol 929, No 4, p 1690, December 24, 1974.

Descriptors: *Patents, *Waste water treatment, *Disinfection, *Oxidation, *Chlorination, Water pollution treatment, *Sewage treatment, Alkali metals, Equipment, Electrolysis, Suspended solids.
Identifiers: Electrosanitizing, Primary treatment, Secondary treatment.

A process for oxidizing and disinfecting waste water is accomplished by placing waste water containing an alkali metal chloride into a first container. The waste water is agitated and macerated so that any solids are comminuted. While agitating and macerating, the waste water is subjected to electrolysis whereby chlorine is produced. The waste water is then transferred to a second container where it is further agitated and finally removed as purified water. The process is performed in an apparatus which comprises a primary treatment container. The container has a combination agitator and macerator and an electrode pack containing at least one anode and cathode and is connected to a direct current source. A secondary treatment container has an agitator and an outlet for treated water. It may also contain an electrode pack. (Sinha-OEIS)
W75-04464

LIGNIN SEPARATION BY CONTINUOUS ION FLOTATION: INVESTIGATION OF PHYSICAL OPERATIONAL PARAMETERS,
Rutgers - the State Univ., New Brunswick, N.J.
M. H. Wang, M. L. Granstrom, T. E. Wilson, and L. K. Wang.
Water Resources Bulletin, Vol 10, No 2, p 283-294, April, 1974. 3 fig, 9 tab, 11 ref. OWRT A-022 NJ(4).

Descriptors: *Lignins, *Pulp wastes, *Flotation, *Water purification, Waste treatment, Water pollution treatment, *Operations research, Systems analysis, Separation techniques, Model studies, Foaming, *Waste water treatment, Foam separation, Water pollution sources, Ions, Surfactants.
Identifiers: Indulin C, *Ion flotation.

The removal of synthetic kraft lignin (Indulin C) from aqueous solution by a continuous ion flotation system was investigated. A feed solution of lignin (100 mg/liter) was treated with 50 mg of cetyldimethylbenzylammonium chloride/liter and passed downward through a plexiglas column (10.26 cm inside diameter) as air flowed upward. Lignin removal was 95% when the air flow was 2000 cu m/min, the feed rate was 100 cu m/min, and the lignin feed inlet was above the solution/foam interface. (Buchanan-IPC)
W75-04476

NOTES--WORKSHOP ON COMPUTER-AIDED DESIGN AND SIMULATION OF WASTE TREATMENT SYSTEMS,
Silveston (B and P), Kitchener (Ontario).
Training Manual EPS 6-WP-74-1. Water Pollution Control Directorate, Environmental Protection Service, Environment Canada, January 1974. 459 p, 127 fig, 38 tab, 176 ref, 2 append.

Descriptors: Computers, *Design, *Simulation analysis, *Waste water treatment, *Computer programs, *Computer models, *Model studies, Engineering, Management, Waste water (Pollution), Equations, Systems analysis, Optimization, Streams, Activated sludge, Trickling filters, Costs, Risks, Treatment facilities.
Identifiers: Clarifiers.

The potential for computer application to performance, planning and design studies of waste treatment systems is substantial. The rapid advance in software applications makes it possible to handle 'non routine' waste treatment systems almost as easily as 'routine' ones. Computer-aided design makes explicit allowance for uncertainty; design risks can be quantitized. Software packages are presented which overcome many of the problems usually associated with computer application to planning and design situations. These packages have been organized so that the judgement and experience of senior staff can be brought to bear on design or analysis problems almost as easily as they can using conventional engineering procedures. The software has been developed so that its use, and even modification, is not limited to computer specialists. Moreover, computer costs have become surprisingly reasonable. The types of programs discussed will require only 5 to 15 seconds of computing time/run (at a cost of $2 to $6). Considered herein are: the use of computers in process analysis and design; choice of design approach; process systems analysis; stream vectors; developing a model library; clarifier models; activated sludge systems; trickling filter models; digester models; preliminary treatment, chlorination and miscellaneous models; sludge treatment processes; and an executive program, SEPSIM, including its user's manual. Computer-aided procedures do a substantially better job at little extra cost. (Bell-Cornell)
W75-04518

MODELING SEWAGE TREATMENT PLANT INPUT BOD DATA,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
P. M. Berthouex, W. G. Hunter, L. C. Pallesen, and C. Y. Shih.
Journal of the Environmental Engineering Division, American Society of Civil Engineers. Vol 101, No EEI, Proceedings paper No 11132, p 127-138, February 1975. 5 fig, 2 tab, 6 ref.

Descriptors: *Sewage treatment, *Statistical methods, *Environmental engineering, *Biochemical oxygen demand, *Stochastic processes, *Time series analysis, *Input-output analysis, Water quality control, Methodology, Treatment facilities, Design, Forecasting, Mathematical models, Systems analysis, Equations.
Identifiers: System performance, Control methods, First-order autoregressive model, Influent data.

A wastewater treatment plant is a complex stochastic dynamic system. The first step toward the design of a control system is to model the stochastic system inputs and outputs. The basic shortcomings of deterministic models for studying a stochastic process are illustrated. The methodology developed by Box and Jenkins (1970) to model time series is used to characterize the field BOD data for a sewage treatment plant; basic stochastic models are given. A first-order autoregressive model is found to describe influent BOD data fairly well. Model-building is seen as an iterative process that is most efficiently done with simple models; only if the models prove inadequate should further complexities be introduced. Stochastic models often contain relatively few parameters and are simple to interpret and apply. Modeling system inputs and outputs is the first step in deriving stochastic dynamic transfer functions for the system. (Bell-Cornell)
W75-04528

DESIGN, CONSTRUCTION AND LAUNCHING OF A SUBMARINE OUTFALL SEWER AT WHITSTABLE,
Whitstable Urban District Council(England).
B. E. Hardy.
Journal of the Institution of Municipal Engineers, Vol 100, No 7, p 201-207, July 1973. 5 fig, 2 tab, 10 ref.

Descriptors: *Environmental engineering, *Sewage disposal, *Outfall sewers, *Design, *Construction, *Pipelines, *Water pollution control, *Public health, Standards, Technology, Oceans, Coasts, Submarines, Domestic wastes, Industrial wastes, Fisheries, Effluents, Toxicity, Currents(Water), Economic efficiency, Waste treatment, Costs, Hydrographs, Dilution, Diffusion, Equations.
Identifiers: Whitstable(North Kent-England), Tidal estuaries, Launching.

Extremely large amounts of domestic sewage and industrial wastes are discharged daily along the eastern and southern coasts of England. The municipal engineer, who must consider whether to dispose of his town's sewage to sea after only partial treatment, is obliged to investigate public health, amenity, and fishery conditions as well as the strictly technical investigations of currents, the sea bed, flow, and design criteria. Problems of sea outfall design are discussed considering the technical aspects and public health philosophy of disposal of partially treated sewage to the sea by means of a long outfall. Considered also is engineering design in the construction of an outfall. Data are reported, including details referring to the outfall at Whitstable on the North Kent coast, in order to assist those who must solve similar problems in coastal waters and tidal estuaries. Discussed are the contract, the design of the pipeline, four basic methods of laying such pipeline, and the pipe launch itself. Given acceptance of and compliance with the present philosophy of public health and other standards required, then disposal of partially-treated domestic sewage to coastal waters is an economic and satisfactory method of disposal and can produce substantial total annual savings to a local authority. The problem, however, is complicated and opinions may change as fresh scientific data are evaluated. (Bell-Cornell)
W75-04536

A PROTOTYPE SYSTEM TO RENOVATE AND RECYCLE SWINE WASTES HYDRAULICALLY,
Iowa State Univ., Ames.
R. J. Smith.
Ph.D. Dissertation, Department of Agricultural Engineering, Iowa State University, 1971, 176 p, 21 fig, 91 tab, 63 ref.

Descriptors: *Farm wastes, *Hogs, *Recycling, Hydraulics, *Waste water treatment, Lagoons, Anaerobic conditions, *Oxidation lagoons, Sludge, Effluent, Biochemical oxygen demand, Nitrates, Phosphates, Chloride, *Water reuse.
Identifiers: *Oxidation ditch, Flush tank, Settling tank, Land application.

The objective was to determine the parcticality of a recycled effluent system for manure transport in swine finishing buildings. Manure handling was accomplished with a continuous flow gutter and latter with a flushing tank. Better pen cleanliness was accomplished with continuous flow and rapid flushes, but this method led to an increase in the

volume of manure slurry requiring treatment. Three treatment systems were observed: anaerobic lagoon and oxidation ditch, oxidation ditch alone and lagoon alone. The best quality returned effluent came from the anaerobic lagoon and oxidation ditch. It appears that effluent from any of the three treatment systems does not adversely affect pig performance. None of the three systems was capable of producing a final effluent suitable for discharge to a watercourse. Final disposal would ultimately have to be by land application. (Russell-East Central)
W75-04542

ECONOMIC AND ENVIRONMENTAL CONSIDERATIONS IN DAIRY MANURE MANAGEMENT SYSTEMS,
New York State Coll. of Agriculture and Life Sciences, Ithaca, N.Y. Dept. of Agricultural Economics.
J. J. Jacobs, and G. L. Casler.
Cornell University Agricultural Experiment Station Report A E Res 72-18, December, 1972, 31 p, 1 fig, 4 tab, 8 ref.

Descriptors: Economics, Environmental control, *Dairy industry, *Farm wastes, *Waste treatment, *Waste storage, *Waste disposal, Lagoons, *Water pollution control, Odor, Costs, Labor, Equipment, Research.
Identifiers: Questionnaires, Flies, Waste management system.

Results of the analysis suggest that almost any realistic alternative to daily spreading will increase the cost of manure handling on dairy farms, but will not necessarily decrease the environmental impacts. Preliminary attempts to measure and aggregate the environmental impact of alternative manure handling systems indicate that the difference among systems is not as great as that implied by those who have suggested that dairymen should be doing something other than daily spreading. Storage of lagoon systems are expensive and eventually result in adverse effects on the environment. This suggests further research must be done on the environmental effects of alternative manure handling systems before making overall recommendations on what is the appropriate system. (Russell-East Central)
W75-04543

COPROLOGY: A POLLUTION SOLUTION,
Ohio State Univ., Columbus.
E. P. Taiganides.
Agricultural Engineering, Vol 55, No 4, p 21, April 1974. 1 fig.

Descriptors: *Recycling, *Farm wastes, Sewage, Municipal wastes, Pollutants, Foods, Ecology, Methane, Gases, *Waste treatment, *Water reuse, *Waste water treatment.
Identifiers: Coprology, *Waste management.

Coprology is defined as the science of waste management. The basic premise of coprology is that there is no such thing as waste. Everything is a resource. Research is being conducted to find new ways of recycling wastes. It is estimated that livestock wastes in the United States could be used to produce methane gas in sufficient quantities annually to meet a large part of our natural gas requirements. The potential value of manure-derived methane gas is over one billion dollars. Also, city waste refuse is being made into building blocks or into heat energy. City sewage is being used to increase productivity of land. In the future, the need for more food will drastically increase. With this increase will be a matched increase in waste production. The problems of waste management must be dealt with and controlled and future industrialization must not only be justified on economic and political terms, but also on ecological terms. (Russell-East Central)
W75-04545

FARMS ARE NOT IN THE COUNTRY ANY MORE,
New Jersey Agricultural Experiment Station, New Brunswick.
C. J. Teller.
Compost Science, Vol 11, No 1, p 8-9, January-February, 1970. 2 fig.

Descriptors: *Waste disposal, *Livestock, *Farms, *Farm wastes, Recycling, Aeration, *New Jersey, Research and development, Dairy industry, Hogs, Odor.
Identifiers: *Suburban areas, Land disposal, Composting, Soil conditioner, Plowing.

Dairy farms in New Jersey adjoin industrial parks and only the width of a highway separates a South Jersey hog farm from a new housing development. A series of projects is being carried out at the Rutgers College of Agriculture and Environmental Science concerning the problems of agricultural solid wastes in today's suburban society. A special 'Animal Waste Disposal Task Force' was organized with representatives from 23 local, State, and Federal public and private agencies and organizations interested in animal waste disposal. Environmental scientists, engineers, and soil chemists are studying the feasibility of incorporating manure into the soil. Equipment has been developed for making a furrow, placing manure in it, then covering the manure and opening another furrow all in the same operation. The feasibility of composting manure has also been investigated. The first trial is now under way utilizing a roto-shredder to aerate the windrows. It is not expected that composting will be a profit-making venture. Dairy and hog farmers may have to sell it at about half what it costs to make it in order to dispose of manure. The composition of odors and flavors is being studied and a project that will utilize fungi to convert carbohydrate waste into protein supplement is being considered. Walker-Gordon Farm in Plainsboro has been drying manure, mixing it with cocoa shells to deodorize it, and selling the mixture as a soil conditioner. (East Central State College)
W75-04546

FERTILITY,
Crops and Soils Magazine, Vol 25, No 1, p 28, October, 1972. 1 fig.

Descriptors: *Fertility, *Fertilizers, *Waste disposal, *Farm wastes, Economics, Cattle, Waste storage, Agriculture, Nitrogen, Phosphorus, Potassium, *Waste treatment.
Identifiers: Chemical fertilizers, Spreading.

Manure's cash value as a fertilizer is discussed. One cow will produce about 15 tons of manure per year which contains nitrogen, phosphorus, and potassium. If one purchased this much fertilizer commercially it would cost about $30. However, when manure is spread in the open almost any time of the year it will lose about a third of its original value. Spreading the manure in the winter will increase the losses. The main losses come from spreading, not storing, so it is best to plow the manure down as soon as possible after spreading. Therefore, the best method to use would be to store the manure all year and spread it just before fall plowing. (East Central State College)
W75-04550

INDIANA POULTRYMEN ARE COMPOSTING POULTRY MANURE,
Purdue Univ., Lafayette, Ind.
J. G. Berry.
Compost Science, Vol 12, No 1, p 4-5, January-February, 1971. 3 fig.

Descriptors: *Poultry, *Farm wastes, Costs, *Indiana, *Waste treatment, Odor, Waste storage, Ventilation, Aeration, Waste disposal.
Identifiers: *Composting, Flies, Deep-pit system.

Poultrymen in Indiana have found a method of composting poultry manure that reduces labor costs, and virtually eliminates fly and odor problems. Laying hens are housed in cages or on slats above pits in which the droppings are collected. If the pit is kept dry, there is no odor at all. One pit, in operation for 6 years, had a 34-in. deep compost, which was dry to a depth of 18 in., and moist below. This system is generally successful, and where problems occur, they are not as great as those resulting from handling manure by conventional methods. (East Central State College)
W75-04552

THE SOCIAL REDEMPTION OF PURE GARBAGE,
J. Solomon.
The Sciences, Vol 12, No 6, p 13-15, July-August 1972.

Descriptors: *Reclamation, *Waste treatment, *California, Anaerobic digestion, Methane, Fuels, Gasses, *Recycling.
Identifiers: *Garbage, Chlorine, Sulfur.

Possibilities for converting garbage into fuel are outlined. If garbage were efficiently converted to power, it could furnish up to 6 percent of total U.S. energy needs. Each pound of garbage can supply 3,000 to 6,000 Btu of heat. One company fed pulverized refuse into a power generating station. Waste provides 10 percent of the energy fired. In another process, solid waste is reduced in size and fed to a pressurized, fluidized bed combuster. Hot gasses are cleaned of particulates and passed through a gas turbine to produce electricity. In both cases, however, chlorine produced in the off-gasses is a potential pollutant. A corporation in California is attempting to produce oil, fuel gas, and solid char by exposing solid waste to iron removal processes, air classification, shredding, and pyrolysis. Another firm reacts solid waste with carbon monoxide in the presence of sodium carbonate to yield low-sulfur fuel. If all of the nation's animal waste were treated by anaerobic digestion, half of the current methane consumption would be produced. (East Central State College)
W75-04553

ENERGY NEEDED TO MANAGE ANIMAL WASTE.
Electrical World, Vol 178, No 5, p 70-72, September 1, 1972. 2 fig.

Descriptors: *Energy, *Farm wastes, *Management, *Recycling, *Waste treatment, *Waste disposal, Feed lots, Feeds, Drying, Spreading, Irrigation, Aeration, Oxidation lagoons.
Identifiers: Pyrolysis.

As the demand for some form of animal waste handling system grows, so will the demand for energy necessary to drive these systems. The most popular way of dealing with animal waste today is to incorporate air into liquid wastes. Processes of this type use aeration wheels, discs, or aeration pumps and are generally electrically powered. Floating aerators, sprinkling systems, and oxidation ditches require substantial amounts of energy since they typically use 3-hp motors for each aeration unit. Animal wastes can also be dried and sold; the market at present for dried manure is very good. This process too requires heat energy from some source, as does pyrolysis, a means by which manure has been successfully converted into a range of products including crude oil, natural gas, and treated manure. Recycling of animal wastes as feed for the beasts that produced the manure in the first place probably holds more potential than almost any other recent feeding discovery. The basic requirement for the conversion of manure to feed is heat to promote the thermophilic bacterial reaction involved. Another popular concept--returning the wastes to land--will

necessitate either electrical or internal-combustion power supplies to operate the sprinkler systems and pumps. (East Central State College)
W75-04554

PERPETUAL-MOTION RECYCLING, OR, PIG MANURE INTO FISH FOOD,
M. Franz.
Compost Science, Vol 12, No 5, p 21, September-October 1971. 1 fig.

Descriptors: *Recycling, *Farm wastes, Livestock, Hogs, Feeds, *Fish farming, *Fish diets, *Waste treatment.

A system has been proposed for recycling the 1,000,000,000 tons of animal manures generated in the United States each year. The manures are dumped into ponds where they stimulate the rapid growth of the plant life on which some fish feed. The fish can then be harvested for human consumption. Also, an aquatic plant species, Ipomoca repens, which is a suitable pig feed, can grow rapidly in the manure-fertilized ponds. A pig farm in Malaya flushes the manure from 700 pigs into eight fish ponds, covering 2 1/4 acres, stocked with Siberian white Amur and Tilapia mossambica. About 9,000 lb of fish were produced in the first year, and up to 1,250 lb of Ipomoca repens can be harvested daily in peak seasons. The white Amur, buffalo fishes, and Tilapia have all been successfully farmed using this system, and all are considered highly desirable foods for humans. Several species of shellfish, large fresh-water shrimp, and silver and spotted Amur are also being considered as potentially adaptable to the system. Fish farming gives high investment returns, so that, with this system, both animal waste and idle-land problems can be economically solved. (East Central State College)
W75-04555

RECYCLE ORGANIC WASTES AS FEED FOR MEAT ANIMALS.
Compost Science, Vol 12, No 6, p 19, November-December 1971.

Descriptors: *Waste disposal, *Recycling, *Farm wastes, *Organic wastes, Feeds, Livestock, Nutrients, Sawdust, Fertilizers, *Pennsylvania, Waste treatment.
Identifiers: Meat.

Zoologists at Penn State University have been experimenting with feeding farm animals several forms of organic wastes, most of which are of nutritional value. When adequately supplemented with protein, vitamins and minerals, wastes can serve as excellent animal feeds; in addition disposal problems are reduced in a manner which is more economically feasible than is spreading on fields as a fertilizer. Now that DDT is no longer used on orchard trees, apple pomace should be fed to ruminants, for whom it is a satisfactory energy source. Ground waste paper soaked in blackstrap molasses was readily eaten by ruminants, as was sawdust, a roughage substitute which seems to contribute to lower rates of liver abscesses. Finishing rations containing sterilized poultry wastes had not effect on weight gain, meat, carcass quality, or any other factors under study. None of these feeds produced unacceptable levels of arsenic, chlorinated hydrocarbons, or pesticides in meat, fat, or liver tissue. Although consumer acceptance is one stumbling block to such a feed program the technology for this form of waste utilization is already available. (East Central State College)
W75-04556

SIMULATION AND STATISTICAL QUALITY CONTROL FOR WATER POLLUTION ABATEMENT,
Texas A and M Univ., College Station.
For primary bibliographic entry see Field 5G.
W75-04557

WASTEWATER CHARACTERIZATION FOR THE SPECIALTY FOOD INDUSTRY,
American Frozen Food Inst., Washington, D.C.
For primary bibliographic entry see Field 5B.
W75-04560

MICROBIOLOGICAL PRODUCTION OF GEOSMIN,
Rutgers - The State Univ., New Brunswick, N.J. Inst. of Microbiology.
N. N. Gerber.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Environmental Protection Agency, Cincinnati, Ohio, Report EPA-670/2-74-094, p 8, November 1974. 1 fig, 3 tab, 12 ref. 1CB047; ROAP 21AQB; Task 9, R-801630.

Descriptors: *Odors, Odor control, Microorganisms, Fermentation, Chromatograpy, *Actinomyces, *Waste water treatment, Sampling, Water quality standards.
Identifiers: Methylisoborneol, *Standard samples, *Geosmin production, *Streptomyces.

Geosmin, trans-1, 10-dimethyl-trans-9-decalol, is produced by numerous actinomycetes and some blue-green algae. It has been shown to be responsible for earthy/musty odors in public water supplies. Samples of purified geosmin were needed for use as odor standards and for use in water treatment unit process development studies. This work was carried out to fulfill this need. The microorganism, Streptomyces sp. CWW3, was grown for 5 days at 28 deg with shaking in a broth medium. The mixture was steam distilled and the clear distillate extracted with methylene chloride. The geosmin containing methylene chloride extract was separated and the geosmin purified by column and gas chromatography. Seven hundred nine milligrams of geosmin was prepared. (EPA)
W75-04561

SURGE FACILITY FOR WET AND DRY WEATHER FLOW CONTROL,
Y-T-O and Associates, Walnut Creek, Calif.
H. L. Welborn.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Environmental Protection Agency, Cincinnati, Ohio, Report EPA-670/2-74-075, p 86, November 1974. 25 fig, 24 tab. 1BB034; ROAP 21-ASY; Task 140, EPA Demonstration Project S800769.

Descriptors: *Surge tanks, *Storm surges, Flood control, *Flow control, Sewage, Sewage disposal, Flow measurement, Flow distribution, Sewage treatment , *Settling basins, *Storage tanks, Underflow, Sedimentation tanks, Water influx, *Infiltration, Wastewater treatment.
Identifiers: Surge basins. Flow equalization, Sludge removal, Pool sweep, Sedimentation-equalization, Peak storm flow.

A surge facility was tested which provided peak flow equalization and some degree of treatment to all storm flows and rate control of all wet and dry weather wastewater flows. The facility was designed to test a method whereby solids could be prevented from accumulating on the bottom of an inexpensive earthen, lined basin without the use of conventional mechanical sludge collection equipment. The principal features of the surge facility were a 2,841 cubic meter (0.75 million gallon) Sedimentation-Equalization Basin, variable underflow pumps, a surface aerator and Pool Sweeps. The Pool Sweeps were used to continuously 'sweep' the bottom and sides of the earthen, lined basin to move and temporarily resuspend the settled sewage solids and, thereby, maintain the flow of solids in the absence of mechanical collection mechanism, steep bottom slopes, or a completely mixed basin. Under the storm flow conditions, the surge facility removed approximately 45 percent of the influent Suspended Solids and 90 percent of influent Settleable Solids prior to overflow to a storage pond. Although a significant portion of the solids flow through the surge basin could be attributed to the operation of the Pool Sweeps, their overall performance could not justify their use in other similar facilities. (EPA)
W75-04562

DRY CAUSTIC PEELING OF CLINGSTONE PEACHES ON A COMMERCIAL SCALE,
Del Monte Corp., San Francisco, Calif.
H. E. Stone.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Environmental Protection Agency, Corvallis, Oregon, Report EPA-660/2-74-092, December 1974. 61 p, 5 fig, 11 tab, 5 ref, append. 1BB037, EPA Grant. No 12060 HFY.

Descriptors: *Canneries, *Water pollution sources, Peaches, Costs, Liquid wastes, *Waste water treatment, Industrial wastes.
Identifiers: Food processing, Canning, Liquid waste reduction, *Fruit peel removal.

This study evaluates the peel removal ability and rinse water characteristics for the first commercially sized equipment using the principle of rapidly rotating rubber discs to gently wipe softened peel off Clingstone peaches. The conventional process utilizes large volumes of fresh water to remove the softened peel and flush it into the liquid effluent from the plant from where it cannot be easily separated. The dry caustic unit demonstrates that gentle abrasion can remove the softened peel, yield a peach suitable for commercial canning and allow for separation and collection of a major portion of this solid residue; thereby preventing its entry into the liquid waste stream. In addition to an approximately 60% reduction in the BOD loading in the liquid waste stream, an approximately 90% reduction in the fresh water requirement for this phase of the preparation of Cling peaches is demonstrated. These reductions in volume of liquid effluent and in the total pounds of organic matter which must be treated are beneficial to both private and public wastewater treatment facilities. A potential increased operating cost to the canner is indicated to be attributable to slightly increased peel loss and to costs associated with the handling of solid residues separated and collected from the dry caustic peeler. (EPA)
W75-04564

SEPARATION, DEWATERING AND DISPOSAL OF SUGARBEET TRANSPORT WATER SOLIDS, (PHASE I),
American Crystal Sugar Co., Denver, Colo.
I. V. Fordyce, and A. M. Cooley.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Environmental Protection Agency, Corvallis, Oregon, Report EPA-660/2-74-093, p 66, December 1974. 7 fig, 13 tab, 7 ref, 3 append. 1BB037; Task 21 BAB/083, EPA Grant No 12060 ESC.

Descriptors: Separation techniques, *Waste water treatment, Water quality control, Water reuse, Waste treatment, Treatment facilities, Pollution abatement, Industrial wastes, *Sugarbeets, Coagulation, Sludge disposal, Filtration, Dewatering.
Identifiers: pH control.

The objectives were to determine the settling characteristics of solids from sugar beet washing and fluming operations in a clarifier, the filtering characteristics of the underflow slurry from a clarifier and the disposal of the filter cake without subsequent development of objectionable odors. The results were to be used to determine the feasibility of installing full scale filters for filtration of and removal of the suspended solids from the transport water and complete recycling of water.

Buildup of organic matter in the water and consequent bacterial growth necessitated the maintenance of high pH by addition of slacked lime. It was necessary also at intervals to add paraformaldehyde to control bacterial growth. Dosages are given. Best conditions for filtration were obtained when the underflow from the clarifier was heated, the pH was maintained over 10.5 and when the waste lime cake from beet juice purification was added to the feed to the clarifier. The filter cake which was accumulated was disposed of on farm land by three different methods and did not develop objectionable odors in any of the methods used. (EPA)
W75-04565

WATER RECYCLE/REUSE POSSIBILITIES: POWER PLANT BOILER AND COOLING SYSTEMS,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
G. R. Nelson.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, price $1.15. Environmental Protection Agency, Corvallis, Oregon, Report EPA-660/2-74-089, p 51, December 1974. 13 fig, 7 tab, 15 ref, 2 append.

Descriptors: Water types, Industrial water, Water costs, *Water demand, *Water reuse, Cooling water, Waste water treatment, Recycling, Boiler feed water.

The methodology to evaluate, in economic terms, potential power plant boiler and cooling system water recycle/reuse programs is presented. Drum type boiler systems and closed cycle cooling systems are used as the basis for the programs' water requirements. The evaluations take into account the variable plant characteristics such as makeup water quality, fuel type, thermal efficiency, capacity factor and fixed charge rate. The evaluation methodology is applicable to existing and proposed power plants, on an individual plant basis--and can be used to determine the over-all economics of potential recycle/reuse programs. (EPA)
W75-04566

AN EVALUATION OF MARKETABLE EFFLUENT PERMIT SYSTEMS,
Meta Systems, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5G.
W75-04571

BACTERIAL ZOOGLOEA FORMATION,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
R. F. Unz, and S. R. Farrah.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 235 023, $4.75 paper copy, $2.25 microfiche. Environmental Protection Agency, Cincinnati, Ohio, Report EPA-670/2-74-018, April 1974. 86 p, 35 fig, 18 tab, 71 ref. 1BBO43/21ASR/003.

Descriptors: *Activated sludge, *Bacteria, Flocculation, Polymers, Scum.
Identifiers: *Zoogloea sp., Zoogloea ramigera, Zoogloeal bacteria, Flourescent antibody.

Activated sludge flocs suspended in wet mounts on microscope slides were observed to sprout, finger-like, bacterial zoogloeae as a consequence of the outgrowth of bacteria from flocs. The rate of extension of finger-like zoogloeae was typically 5.1 to 15.0 micro per hr and mean cell doubling time was estimated to be approximately 2 hrs. Photomicrographic and fluorescent antibody studies revealed that the bacterial zoogloeae consisted of the progeny of specific zoogloea-forming bacteria. Purified exopolymers of Zoogloea strains and domestic activated sludge contained two amino sugars, one of which was identified as glucosamine. Zoogloea exopolymer was not fibrilar or cellulosic and contained approximately 17 to 19 per cent amino sugar and about one per cent hexoses, uronic acids and ether soluble substances on a dry weight of polymer basis. Amino sugar production was found to parallel zoogloea formation by Zoogloea sp. Calcium ion appeared to augment flocculation of bacterial cells capable of undergoing natural coalescence. Two cell types, described as rough and smooth colony-forming, were found in some strains of Zoogloea. Rough cells readily flocculated in agitated cultures whereas smooth cells produced relatively turbid cultures under similar growth conditions. A predominance of one of the two types could influence the degree of flocculation by Zoogloea cultures. (EPA)
W75-04572

AN ASSESSMENT OF WET SYSTEMS FOR RESIDENTIAL REFUSE COLLECTION: SUMMARY REPORT,
Curran Associates, Inc., Northampton, Mass.
P. M. Meier, J. Kuhner, and R. E. Bolton.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 236 085, $5.25 paper copy, $2.25 microfiche. Environmental Protection Agency, Report EPA-670/2-74-068, August 1974. 92 p, 14 fig, 11 tab, 9 ref. 1DB064/ROAP-09ADA/Task 04 EPA Contract 68-03-0183.

Descriptors: *Wastes, Sewers, Waste disposal, Economics, *Pipelines, Transportation, Mathematical models, Sewage treatment, *Waste water treatment, *Domestic wastes.
Identifiers: *Solid waste collection, Ground refuse transport, Economic feasibility study, *Hydraulic transport, *Combined refuse/sewage treatment, *Grinders(Refuse).

The most promising wet system alternative is identified as a system using individual household grinders in low density areas, vacuum collection and neighborhood grinders in high density areas, dilute slurry transport of ground refuse in the existing sanitary sewer system, and joint treatment of refuse and sewage at an expanded treatment facility that includes anaerobic digestion for methane generation. However, the economic feasibility of even the most promising alternative is doubtful because of the high cost of grinding, and hydraulic transport of ground refuse in existing sewer systems may be feasible only if both metals and glass are excluded. A conventional collection of the nongrindable and bulky constituents of residential refuse will still be needed, albeit of a diminished frequency. The total 1973 cost of such a wet system is estimated at $113-196 per household per year, of which $80-$105 is for grinding. This compares to a total cost for refuse and sewage collection and disposal under existing concepts of up to $115 per household per year. Projections for 1988 indicate that the wet system cost might rise to $130-$228, against a range of $61-$143 under conventional concepts. However, if the cost of the grinder is excluded (on the basis that individuals would purchase grinders for their convenience benefits), the 1973 wet system costs (to the public sector) would be only $33-$91, thus possibly less than existing public sector costs of about $43-$115 per household per year. (EPA)
W75-04577

SALMONELLA AND NATURAL PURIFICATION OF POLLUTED WATERS, (IN GERMAN),
For primary bibliographic entry see Field 5C.
W75-04578

CONTROL OF POLLUTION FROM ANIMAL FEEDLOTS AND REUSE OF ANIMAL WASTES,
Committee on Government Operations (U.S. House).
93rd Congress, 2nd Session, House Report No 93-1012, 1974, 68 p. 1 fig.

Descriptors: *Water pollution, Control, *Feed lots, *Farm wastes, *Livestock, Legal aspects, Permits, Regulation, Fertilizers, Fuels, *Recycling, *Waste treatment, Waste disposal, Cattle.

The Federal Government's efforts to control pollution from animal feedlots by more efficient management of wastes and by encouragement of their reuse as fertilizer and fuel are reviewed. The nature of feedlot pollution from feedlots, and the current EPA policies for control are discussed. Also discussed is the pollution problem versus the administrative problem. Permit requirements for point source pollutors, are described. Appendices the types of animal feedlots, and the EPA's authority to exclude point sources from the permit program. Supplemental views of Hon. John C. Culver and dissenting views of HON. Charles Thone are included. (Russell-East Central)
W75-04615

DEVELOPMENT OF AN ORGANIC WASTE SLURRY INJECTOR,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
R. C. Gold, and J. L. Smith.
Paper No 73-4529, presented at 1973 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 11-14, 1973, 12 p. 6 fig, 15 ref.

Descriptors: *Farm wastes, Organic wastes, *Waste disposal, *Slurries, *Injection, Irrigation, Odor, Aesthetics, Economics, Ground water, Runoff, Soil analysis, Insects, *Waste water treatment, *Water reuse.
Identifiers: *Land spreading, Deep plowing.

Organic waste disposal methods have changed little over the last several decades. However, these usually create aesthetic and pollution problems which have resulted in an attempt to find new and better ways to dispose of organic wastes. The presence of organic matter and some plant nutrients makes the idea of recycling organic wastes to the soil very desirable. The four usual methods for returning materials to the soil are irrigation, surface spreading, deep plowing or burial, and shallow plowing or injection. Since surface application creates problems, experiments were conducted using a slurry injection system. This type of system offers these advantages: (1) it is inexpensive; (2) it is capable of handling large volumes of wastes; (3) it eliminates odors, visibility, and aesthetic pollution problems; (4) it can be used in any part of the country with sufficient storage capacity for cold weather; (5) it can be operated by one person; and (6) the wastes are recycled and their benefits are not lost. (Russell-East Central)
W75-04616

TAILOR MADE CONFINEMENT BARN,
B. Fleming.
Beef, Vol 10, No 7, p 8-9, March, 1974. 4 fig.

Descriptors: *Farm wastes, *Confinement pens, *Management, Fertilizers, Design, Oxidation lagoons, Lagoons, Costs, Ventilation, Insulation, Waste disposal, Waste storage, Odor, *Iowa.
Identifiers: Barns, Land spreading, Slats.

A confinement barn operation should fit a feeder's personal needs. Lee and Roy Stoll had that in mind when they designed their own confinement barn. The barn was 256 ft. long. The south side of the barn was always open. The cattle were fed by a 250 ft. belt feeder which ran down the middle of the building. The manure handling system consisted of an eight ft. deep pit system. The manure was reclaimed as fertilizer at an estimated savings of about $23 per acre. Other unique arrangements in the barn were varied pen size and slats for the background lot. Drafts were eliminated by using wall-like dividers and insulation. The manure pit

was eight ft. deep, but only about two feet of that was below grade. The rest was built above ground and fill dirt was added. The stall operation is a carefully matched setup, and is tailored for their specific operation. (Russell-East Central)
W75-04617

SEWAGE-GROWN ALGAE AS A FEEDSTUFF FOR CHICKS,
Dept. of Poultry Husbandry. California Univ., Davis.
C. R. Grau, and N. W. Klein.
Poultry Science, Vol 36, p 1046-1051, 1957. 6 tab, 8 ref.

Descriptors: *Algae, *Feeds, *Poultry, *Proteins, *Aluminum, Flocculation, Centrifugation, Neutralization, Sewage.
Identifiers: Chicks, Acid extraction, Tolerance.

Sewage-grown algae meals, which contain about 40% crude protein, have been studied as sources of protein and other nutrients for young chicks. All feeding trials were performed with White Leghorn chicks which were fed a stock diet for ten days after hatching, and then were fed the experimental diets for the next eight days. Both alum-flocculated and centrifugated samples were fed. The chicks tolerated diets containing up to 20% aluminum-free algae meal. The presence of significant amounts of aluminum in the meal depressed chick growth. Neutralization and acid extraction have been unsuccessful in removing the harmful effects of the aluminum. The presence of dark, watery droppings was the only observed adverse effect of feeding the algae meals. This condition was found with alum-flocculated and aluminum-free meals. (Cameron-East Central)
W75-04618

NEW AEROBIC PROCESS TURNS WASTE TO NUTRIENTS,
AgChem and Commercial Fertilizer, Vol 27-28, No 12-1, p 24-27, December 1972-January, 1973. 7 fig.

Descriptors: *Farm wastes, *Nutrients, *Fertilizers, Feed lots, Cattle, Feeds, Urine, Aerobic conditions, *Ohio, *Aerobic treatment, *Waste treatment.
Identifiers: *Digestors.

The first animal-waste, large scale sterilized organic fertilizer capability is being developed by the operator's of Ohio Feed Lot-the world's largest pollution-free enclosed cattle feedlot. Cattle manure is collected by front-loading tractors, dumped into large fan ventilated vats and fed to an aerating digestor. Once the manure is sterilized it is bagged and packaged in 5, 10, 25, and 50 pound bags for use as organic fertilizer and sold. Great pains have been taken to make this feedlot operation as self sufficient and environmentally ameliorating as possible. Techniques include utilization of natural air flow (aided by fans), the creation of an impermeable feedlot surface, and the development of a guarded cattle diet using the feedlot's own corn-based feed. (Drewry-East Central)
W75-04619

NUTRIENT RECOVERY: NEW CONCEPT IN WASTE HANDLING,
P. D. Andre.
Beef, Vol 10, No 7, p 74-76. March, 1974, 6 fig, 1 tab.

Descriptors: *Nutrient removal, *Farm wastes, *Waste water treatment, *Recycling, Water purification, *Confinement pens, Model studies, Bacteria, Separation techniques, Irrigation, Fertilization.
Identifiers: *Waste handling, Refeeding.

In the near future, cattle feeders may begin to use a nutrient recovery system as an integral part of a confinement feeding building. Such a system has been developed and is currently undergoing experimentation. This system starts with raw manure and through a series of three stages removes the organic and inorganic nutrients for animals and field crops, ending with clear water. In the first stage, 30% of the total available dry solids can be removed. The second stage, which can involve up to five steps, removes most of the remaining nutrients. The third stage is a water purification stage. The cost of such a system is very high, but experiments indicate that returns from the system can be considerably higher than the cost. The nutrient value of the extracted wastes appears to be very high, and a well balanced high protein feed is the result of the process. Although there are minor problems to overcome, the Corral Nutrient Recovery System's designers are confident that it will offer substantial gains for confinement feeding. (Russell-East Central)
W75-04620

SLATS IN THE SOUTHWEST,
P. D. Andre.
Beef, Vol 10, No 1, p 62, 70, 71, September, 1973. 3 fig.

Descriptors: *Confinement pens, *Performance, Cattle, Costs, Lagoons, Sprinkling, Waste disposal, Southwest U.S., Waste Treatment, *Arizona.
Identifiers: *Slats, Open feed lot.

Operational facilities are described for a confinement facility with a capacity for 10,000 head of cattle. The advantages of the confinement pen versus the open pens are given in detail. Only seven acres are needed for the confinement pen versus 30 for the open pens. Confinement, it is estimated, should save hiring two men, as compared to open lots. Since the feed truck only has to travel over seven acres rather than 30, another savings of $1,800 is listed. Other advantages are: more pleasant working conditions for employees, ease of handling animals, possible improvement in conversion rates and death loss, odor and fly control, pollution prevention, easier management and supervision, more consistent quality of beef, faster turnover of cattle at lighter weights, and longer total life of the facility. Severe performance slumps due to weather can also be avoided; consequently, management can project business more accurately. There is an estimated $100,000 yearly advantage for this Arizona feedlot in choosing confinement rather than open lot. (Cartmell-East Central)
W75-04621

FAST FLUCH SYSTEM,
R. H. Brown.
Feedlot Management, Vol 15, No 11, p 10-12, November, 1973. 4 fig.

Descriptors: *Farm wastes, *Cattle, *Waste water treatment, *Waste disposal, *Feed lots, *Irrigation, Slopes, *South Carolina.
Identifiers: Forage yields.

A southeastern U.S. cattle farm uses fast flushing to remove wastes from concrete floors. Walworth Farms, feeding up to 5,000 head of cattle, flushes the 21/2% sloping floor with up to 9,000 gallons of water. Runoff flows into a catch ditch to an underground pumping station which further liquifies it and then it flows into portable irrigation pipes. The runoff irrigates up to 1,600 acres of grassland and cropland. The farm also has two lagoons to handle excess water when there are heavy rains. (Frantz-East Central)
W75-04622

CHARACTERISTICS AND SOIL TREATMENT OF BIOLOGICALLY TREATED SWINE WASTES, VOL. I, CH.1 THRU 3,
Kansas Water Resources Research Inst., Manhattan.
C. E. Burkhead, and M. Trnovsky.
Available from the National Technical Information Service, Springfield, Va., 22161 as PB-239 521 $5.75 in paper copy, $2.25 microfiche. WKRRI Contribution No 132, February 1974. 118 p, 6 fig, 23 tab. OWRT A-042-KAN(1), 14-31-001-3516.

Descriptors: *Soil treatment, *Oxidation lagoons, Hydraulic conductivity, *Biological treatment, *Farm wastes, *Waste water treatment, Feasibility studies, Waste identification, Waste disposal, Water reuse, Soil types, *Kansas, Infiltration, Path of pollutants.
Identifiers: *Swine wastewater, *Land disposal, *Waste characterization, *Holding ponds, *Percolate characteristics, Soil columns, Loading and resting cycles.

Feasibility of treatment and disposal by land application of a holding pond supernatant receiving effluents from oxidation ditches treating swine waste generated in a confined hog growing operation was investigated. The performance of the three oxidation ditches and the holding pond was evaluated. The evaluation was based on statistical analyses of physical and chemical characteristics of the oxidation ditch effluents and the holding pond supernatant. The wastewater was analyzed from data collected from ten random samples for each of the following sampling locations: effluents from the oxidation ditches, the holding pond supernatant, and well water. In addition, data on water consumption, number of hogs in the buildings, and rainfall data were collected. Suitability of five typical Kansas soils for treatment and disposal of the holding pond supernatant was investigated in fifteen indoor soil columns. The columns contained disturbed soil samples representing the following textural classes: sand, sandy loam, silt loam and clay. The wastewater was applied to the column in alternate loading-resting cycles. Infiltration rates and quality changes of the percolate were monitored. Changes in the soil's chemical characteristics as brought about by the application of the supernatant were determined on ten soil columns' increments upon termination of testing. (See also W75-04624)
W75-04623

CHARACTERISTICS AND SOIL TREATMENT OF BIOLOGICALLY TREATED SWINE WASTE, VOL II, CH. 4, THRU 7,
Kansas Water Resources Research Inst., Manhattan.
C. E. Burkhead, and M. Trnovsky.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-239 522 $7.25 in paper copy, $2.25 microfiche. KWRRI Contribution No 132, February 1974. 202 p, 76 fig, 23 tab, 183 ref. OWRT A-042-KAN(1) 14-31-0001-3516.

Descriptors: *Soil treatment, *Oxidation lagoons, Hydraulic conductivity, *Biological treatment, *Farm wastes, *Waste water treatment, Feasibility studies, Waste identification, Waste disposal, Water reuse, Soil types, *Kansas, Infiltration, Path of pollutants.
Identifiers: *Swine wastewater, *Land disposal, *Waste characterization, *Holding ponds, *Percolate characteristics, Soil columns, Loading and resting cycles.

Variation among the physical and chemical characteristics of the oxidation ditch effluents and the holding pond supernatant provided evidence of unsatisfactory in-building management, causing overloading of the oxidation ditches and accumulation of biodegradable pollutants in the oxidation ditch mixed liquor as well as in the holding pond supernatant. Application of the supernatant to the selected soils demonstrated that the soil's reten-

tion capacity for the supernatant constituents is definitely limited. The soil's retention capacity increased with the clay content of the soil and decreased with the wastewater volume applied. In the course of testing, the quantity of the supernatant soluble organics, salts, alkalinity, and cations in the column's effluents increased appreciably with an increase in quantity applied. Basic relationships controlling the transformation of the major wastewater constitutents are described. (See also W75-04623)
W75-04624

ACID MINE WATER, A BIBLIOGRAPHY,
Office of Water Research and Technology, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04625

METHODS OF REMOVING NITRATES FROM WATER,
Robert S. Kerr Water Research Center, Ada, Okla.
P. P. St. Amant, and L. A. Beck.
Journal of Argiculture and Food Chemistry, Vol 18, No 5, p 785-788, September-October, 1970. 1 tab, 7 ref.

Descriptors: *Waste water treatment, *Nitrates, *Algae, *Bacteria, *Denitrification, *Desalination, *Nitrogen, *Nitrites, Oxidation, Costs, Tile drainage, Osmosis, Electrodialysis, Proteins, *California, Filters.
Identifiers: *Algae stripping, *San Joaquin(Calif).

Due to salt accumulation in the water collected by tile systems in the California San Joaquin Valley, it is necessary to dispose ultimately of this water. Reports show that nitrogen, primarily in the nitrate form, is a serious potential pollutant. Two basic methods of nitrogen removal are being evaluated. These methods are termed bacterial denitrification and algae stripping. Two methods of bacterial denitrification are being evaluated: pond denitrification and filter denitrification. Desalination of the tile drainage is also used. Each method is described. Also, the efficiency of each method is discussed. Land requirements for these three systems will vary greatly. Initial cost estimates for nitrogen removal by these three biological systems are nearly the samm-around $25 to $30 per million gal. based on an average influent nitrate-nitrogen concentration of 20 mg per 1. (Cameron-East Central)
W75-04626

DEWATERING BOVINE ANIMAL MANURE,
Pennsylvania State Univ., University Park. Dept. of Agricultural Engineering.
H. D. Bartlett, R. E. Bos, and E. C. Wunz.
Paper No 73-431, presented at 1973 Annual Meeting of the American Society of Agricultural Engineers, University of Kentucky, Lexington, June 17-20, 1973, 26 p. 5 fig, 11 tab, 18 ref.

Descriptors: *Farm wastes, *Dewatering, *Cattle, *Waste water treatment, *Waste disposal, *Waste storage, Slurries, Irrigation, Nutrients.
Identifiers: Fibers.

Research was conducted to develop methods of dewatering bovine manure and determine the properties of the resulting fibrous and liquid components. Methods investigated were: stationary screens (Hydro sieve), vibro-energy rotary screen (Sweco), pressure filtration (d'Arcy equation), porous belt with press-rolls, perforated-shell cone centrifuge, and perforated-shell screw conveyor. Results of the dewatering methods are given and the fibrous and liquid components are analyzed. The liquid contained most of the nutrient value, with nearly half of the nutrients in the particle size range smaller than 325 U.S. Mesh. The chemical oxygen demand was approximately the same for the fibrous component and for the filtrate. Dewatering of manure would allow the liquid to be stored in earthen ponds for later use for crop irrigation. The fibrous solid could then be stockpiled without seepage, odor, or fly problems. (Frantz-East Central)
W75-04627

SWINE WASTE MANAGEMENT SYSTEMS,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
B. Horsfield, J. Gottbrath, and J. Kadlec.
Paper No 73-4517 presented at the 1973 Winter Meeting of the American Society of Agricultural Engineers, Chicago, Illinois, December 11-14, 1973, 33 p. 9 fig, 10 tab, 15 ref.

Descriptors: *Hogs, *Farm wastes, *Waste treatment, *Management, *Evaluation, Costs, Lagoons, Confinement pens, Economics, Waste storage, Separation techniques, Transfer, Transportation, Waste disposal, Odor, Water pollution, Irrigation, Performance.
Identifiers: Oxidation ditch, Slatted floors, Land disposal.

Five unique waste handling systems for confinement finishing hogs were studied and were compared with two common systems. The five systems were: (1) a deep pit with wood slats and earth bottom; (2) partial wood slats, a shallow pit and a two-stage lagoon; (3) full wood slats with a shallow pit and lagoon; (4) a solid concrete floor with flushing and a two-stage lagoons; and (5) partial slats and air diffusion oxidation. The two common systems were; (A) concrete slats and concrete pit; and (B) concrete slats and pit with oxidation ditch and outside storage. Both cost and noncost factors were taken into consideration. The costs ranged from $.75 to $3.89 per head produced if the nutrient value of the wastes were ignored. (Russel-East Central)
W75-04629

EFFECT OF FEEDLOT LAWS AND CLIMATE ON OPEN FEEDLOT WASTE MANAGEMENT,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
A. F. Butchbaker, J. E. Garton, G. W. A. Mahoney, and M. Paine.
Paper No 72-438, presented at 65th Annual Meeting, American Society of Agricultural Engineers, June 27-30, 1972, Hot Springs, Arkansas, 38 p. 12 fig, 6 tab, 16 ref.

Descriptors: *Feedlots, *Regulation, *Legal aspects, *Climates, *Farm wastes, Management, Design, Costs, Precipitation(Atmospheric), Storms, Evaporation, Water pollution, Irrigation, Solid wastes, *Waste treatment.
Identifiers: Storm rainfall, Opean feed lots, Holding ponds.

The effects of climate and the impact of feedlot laws on waste management systems were examined. Analysis of the engineering design requirements for feedlots was made by searching the literature, observing feedlot operations, performing operational analysis of waste handling systems, and from personal conversations. Feedlot laws for regulation runoff control are aimed at reducing the water pollution potential by means of holding ponds. For the waste management systems, the major climatic factors are: annual precipitation, storm rainfall, annual evaporation, and temperature. Analysis of the various alternatives for handling the feedlot waste was done by analyzing the field observations and utilizing the computer to generate design information to perform calculations for comparing the cost of various systems. For a 20,000 head open feedlot with pollution control, the total system costs (Feedlot construction plus waste management systems) are approximately 0.01319 dollars per animal day with an investment cost of approximately $416,000. (Cartmell-East Central)
W75-04630

MANAGEMENT OF SWINE WASTE BY A LAGOON SYSTEM,
Washington State Univ., Pullman. Dept. of Agricultural Engineering.
R. E. Hermanson, and J. L. Koon.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 6, p 1172-1174, 1178, 1973. 4 fig, 1 tab, 9 ref.

Descriptors: *Management, *Farm wastes, *Hogs, Lagoons, *Waste treatment, Water pollution, Aerobic treatment, Anaerobic conditions, Odor, Effluent, Biochemical oxygen demand, Chemical oxygen demand, Nitrogen, Phosphorus, Bacteria, Sampling.
Identifiers: *Swine, Land disposal.

A two-stage anaerobic-aerobic lagoon system can provide a significant reduction in pollutional characteristics of swine waste. The addition of an aerated second stage to an anaerobic lagoon resulted in effluent with mean DOD and COD reductions in the aerated lagoon of 72 and 45%, respectively. A detention time of 2 weeks in the aerated lagoon resulted in average BOD and COD reductions almost equal to those obtained in a 4 or 5 week detention time for the anaerobic lagoon. Total nitrogen was reduced an average of 18% for the 2 week detention in the aerated lagoon and 53% for the 9 week detention. Although significant reductions in effluent concentrations were achieved, the end product was still quite polluted. The levels of BOD, COD, N2, and P along with solids and color, in most states, limited the discharge of wastes from this two-stage system into receiving streams. Disposal on land was the only feasible alternative. The primary effect of the aerated lagoon was the reduction of odor and the amount of pollutants that the land was forced to handle. (Russell-East Central)
W75-04632

HE SOLVED HIS MANURE HANDLING PROBLEM,
Wisconsin Univ., Madison.
T. J. Brevik.
Hoard's Dairyman, p 357, March 10, 1973. 1 fig.

Descriptors: *Farm wastes, *Dairy industry, *Waste treatment, *Waste storage, *Feed lots, *Runoff, Water pollution, Design, *Wisconsin.

A Wisconsin farmer developed a waste handling system that prevented barnyard runoff from running down a slope into a nearby stream. The plan included a 50x50x11 ft. concrete storage pit and curbs which diverted runoff from its natural course. A manure thrower was positioned at the end of the barn to sling wastes into the pit. A 40x60x7 ft. detention pond was recently added. (Frantz-East Central)
W75-04634

MANURE HANDLING SYSTEMS FOR THE FUTURE,
B. Eftink, and L. Searle.
Successful Farming, Vol 72, No 1, p 26-29, January, 1974. 11 fig.

Descriptors: *Farm wastes, *Waste treatment, *Waste disposal, *Recycling, Lagoons, Oxidation lagoons, Waste storage, Fish farming, Economics, Costs, *Forecasting.
Identifiers: Composting.

Most current research efforts are attempting to incorporate the use of manure as an asset instead of a liability. The future promises that manure disposal will be designed to make it pay for itself and, in some cases, provide a profit. Methods for manure disposal, are outlined. They are: (1) Composting manure and selling it; (2) Recycling the liquids and treating manure; (3) Using treatment tanks to decompose manure; (4) Using a hog manure supplement; (5) Piping manure underground to a storage tank; (6) Screening out the

solids; (7) Using an oxidation ditch; (8) Storing manure above ground; and (9) Growing fish in manure lagoons. Some of these nine methods of manure handling are now being used, while others are futuristic. Some will be useful and economical, and some will be impractical. (Russell-East Central)
W75-04635

TENTATIVE CRITERIA FOR DESIGN, CONSTRUCTION AND OPERATION OF THE BATCH TYPE PASVEER OXIDATION DITCH SYSTEM FOR THE TREATMENT OF ANIMAL WASTES,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
A. C. Dale.
February 15, 1968, 20 p. 30 fig, 2 tab, 20 ref.

Descriptors: *Design, Construction, *Operations, *Oxidation lagoons, *Farm wastes, *Waste treatment, Aeration, Digestion, Aerobic bacteria, Anaerobic bacteria, Oxygen, Odor, Volatility, Biochemical oxygen demand, Nitrates, Nitrites, Temperature, Water pollution.
Identifiers: Batch-type oxidation ditch, Facultative bacteria, Continuous treatment system.

A continuous oxidation ditch was developed by the Research Institute for Public Health Engineering, The Netherlands, as a low-cost method for purifying sewage emanating from small communities. The system is a modified form of activated sludge process and may be classified in the extended aeration group of odorless aerobic treatments. For either batch or continuous oxidation ditches to work satisfactorily, an aerator is used to 'beat' oxygen into the waste to support the growth of bacteria and to hold the solids in suspension. Unlike the continuous system, wastes are dumped into the batch oxidation ditch periodically and the aerator is not run continuously. The batch-type ditches reduce dry matter by about 40 to 50% by converting organic matter into carbon dioxide and water. The ditch releases some nitrogen but converts most of it into nitrites and nitrates. The pit (ditch) storage time may be increased by 80 to 90% provided effluent level can be controlled and oxygen transfer is possible at the greater suspended solids content. The oxidation ditch also concentrates the minerals and salt, by about 70 to 90% in the batch process. The design and operation of the oxidation ditch system are discussed. (Cameron-East Central)
W75-04636

TEST SWINE WASTE DISPOSAL SYSTEMS,
Iowa State Univ., Ames.
T. Hargrove.
Wallace's Farmer, Vol 96, p 30, July 24, 1971. 3 fig.

Descriptors: *Hogs, *Waste disposal, *Farm wastes, Testing, Water pollution, Air pollution, Lagoons, Sprinkler irrigation, Water hyacinth, Nutrients, Effluent, *Iowa.
Identifiers: *Swine, Gutters, Flushing.

Iowa State has installed a gutter system in a hog house with a 100-gallon flush lasting 20 seconds once an hour. The swine cooperate. Flushings may be routed to an anaerobic lagoon, an oxidation ditch, or the lagoon and ditch in turn. The excess is spread on corn and/or grassland. Flushing water is recirculated. Water hyacinths are being tested for removal of nutrients from effluents followed by use as cattle roughage. Iowa winters will keep them from becoming a nuisance. (East Central State College)
W75-04637

IRRIGATION FOR LAND APPLICATION OF ANIMAL WASTE,
Purdue Univ., Lafayette, Ind. Dept. of Agricultural Engineering.
B. C. Horsfield, R. Z. Wheaton, J. C. Nye, and J. V. Mannering.
(1973). 20 p. 7 fig, 7 tab.

Descriptors: *Farm wastes, *Irrigation, *Waste disposal, Livestock, Crops, Soils, Runoff, Costs, Equipment, *Indiana, *Water reuse, Water treatment.
Identifiers: *Land application.

Irrigation may be the best means of putting farm wastes back onto the land. Runoff detention, combination manure-and-runoff, and covered manure facilities are described. Major soil and cropping factors affecting irrigation rate are evaluated. Irrigation equipment and systems' costs are described. Tips are given on waste storage management, irrigation equipment use, soil conditions, and crop utilization practices. Only with proper management can the farmer attain the desired results of irrigation. (Frantz-East Central)
W75-04638

SUBFLOOR MONITORING OF SHADY GROVE DAIRY LIQUID MANURE HOLDING POND,
San Bernadino County Agricultural Extension Service, Calif.
J. C. Oliver, W. C. Fairbank, J. L. Meyer, and J. M. Rible.
California Agriculture, Vol 28, No 4, p 6-7, April, 1974. 1 fig, 6 tab.

Descriptors: *Monitoring, *California, *Dairy industry, *Liquid wastes, *Sealants, *Seepage control, Chemical properties, Farm wastes, Waste treatment, Pollutant identification.
Identifiers: *Subfloor, *Holding ponds.

Subfloor monitoring of the Shady Grove Dairy liquid manure holding pond was begun in June, 1972, with the installation of duplicate tensiometer cups at 2,4,6,8, and 9 ft. below the pond floor. Extracts for analysis were collected weekly from ceramic cups for the first six weeks after the pond was filled with manure water. Results of chemical analyses of soil solution extracts from beneath the pond were given. This subfloor monitoring technique established that the dairy waste pond had become effectively sealed. The soil solution analysis as compared with original soil analysis data, leads to the conclusion that sealing of ponds takes place essentially in the upper 6 ft. of soil in a pond bottom. (Cartmell-East Central)
W75-04640

PNEUMATIC TRANSPORTATION OF MANURE,
All-Union Research Inst. of Cattle-breeding, Podolsk (USSR).
A. N. Shimko.
Transactions of the ASAE (American Society of Agricultural Engineers), Vol 16, No 6, p 1170-1171, Nov-Dec, 1973. 1 fig, 3 ref.

Descriptors: *Waste treatment, *Waste storage, Fertilizers, Nutrients, Economics, Organic wastes.
Identifiers: *Pneumatic transportation, Holding tanks, Manure pits, Land spreading.

In Russia, the work involved in loading, unloading, and transporting manure accounts for approximately 40% of all the labor expended on farms. About one-half of this amount is required for handling manure. A pneumatic system was designed to transport and load manure into storage structures on livestock farms of 100 to 2,000 head of cattle. This system eliminated tractors, transport units, and traffic in moving manure from barns to pits. It also provided the means to convey, receive, and store for long periods high quality organic fertilizer without the loss of nutrients. The system involves transportation of manure from barns to the manure tank. When the tank is full, it becomes pressurized to about 6 atmospheres. The manure is then sent through a pipeline and stored at the bottom of a pit. The upper layers of the pit dry and reduce odors. When needed, the top layers are removed and used for fertilizer. (Russell-East Central)
W75-04641

CHANGING FROM DUMPING TO RECYCLING. PART 2. ORGANIC WASTES,
California Univ., Berkeley. Sanitary Engineering Research Lab.
C. G. Golueke.
Compost Science, Vol 13, No 2, p 20-23, March-April 1972.

Descriptors: *Recycling, *Organic wastes *Waste treatment, Feeds, Chemicals, Ponding, Anaerobic digestion, Activated sludge, Trickling filters, Stabilization, Oxidation lagoons, Fermentation.
Identifiers: Pyrolysis.

Methods of recycling the major groups of organic wastes (such as food processing wastes, manure, and wood wastes) are discussed. Their recycling creates three major products: soil, foodstuffs, and useful chemicals. The present treatment methods, concentrating on elimination of wastes rather than reclamation, are reviewed. Ponding is accomplished using anaerobic ponds, facultative ponds, oxidation ditches, and high-rate ponds. The treatment mechanism in the trickling filter is aerobic-biological stabilization of organic wastes suspended or dissolved in water. The activated sludge works on the same principle; it differs from the trickling filter process because no surfaces are provided for the attachment of a microbial layer; it is a compact process, subject to fairly close control. In the anaerobic digestion process, biological decomposition takes place in the absence of oxygen. (East Central State College)
W75-04642

IN-THE-BUILDING OXIDATION DITCHES FOR LIVESTOCK WASTES,
Illinois Univ., Urbana. Dept. of Agricultural Engineering.
D. L. Day.
Water and Wastes Engineering, Vol 7, No 9, p E-23-E-24, September 1970.

Descriptors: *Oxidation lagoons, *Farm wastes, *Livestock, *Waste treatment, *Aerobic treatment, Effluents, Nitrates, Biochemical oxygen demand, Odor, Phosphates, Lagoons, Waste storage, Waste disposal.
Identifiers: In-the-building oxidation ditches, Biological oxidation, Land disposal.

Aerobic treatment for the removal of biodegradable organic matter from liquid wastes is an odorless process consisting of two phases operating simultaneously. One phase is biological oxidation that gives by-products such as carbon dioxide and water, and yields energy. The second phase utilizes the energy from the oxidation for synthesis of new cells. The in-the-building ditch for livestock wastes is a completely mixed aerobic system having a long detention time. The ditch is located beneath the self-cleaning slotted floors in a confinement building. The liquid volume is about 30 cu ft/pound of daily BOD5. The liquid depth is shallow to keep the solids suspended. The depth is kept constant by using an overflow for the mixed liquor. After the bioxidation system comes to equilibrium, the mixed liquor BOD5 will typically be 3,000 to 5,000 mg/L, resulting in a BOD5 reduction of about 90 percent. A low-labor waste treatment system can be formed by allowing the oxidation ditch liquor to overflow by gravity into a non-overflow aerobic lagoon with a fluctuating depth. The effluent is not suitable for direct discharge into a stream, but may be spread on land in an odorless state. Some obvious concerns of this system are: nitrates in the effluent disposed on the field; possible consequences of high rates of application to fields; nitrates, phosphates, and color of the effluent if stream discharge were to be used; and operating costs. (East Central State College)

W75-04643

PIERCED STEEL PLANKING SURFACING FOR FEEDLOT RUNOFF CONTROL,
South Dakota State Univ., Brookings. Water Resources Inst.
J. L. Wiersma, C. B. Gilbertson, J. M. Madden, R. E. Larson, and F. L. Schapler.
Paper No 73-4541 presented at 1973 Winter Meeting, American Society of Agricultural Engineers, December 11-14, 1973 Chicago, Illinois, 16 p, 17 fig, 17 ref.

Descriptors: *Feed lots, *Runoff, *Control, Waste water treatment, *Farm wastes, Cattle, Economics, Water pollution, Infiltration rates, Hogs, Design, Costs.
Identifiers: Pierced steel planking.

The concept of using pierced steel planking in a dish shaped feedlot with a porous surface on a sand bed to partially treat the liquids which had been separated from the solids proved unsatisfactory. It was unsatisfactory because the waste material from the cattle combined with hair to form an impermeable layer on the sand and this prevented vertical water movement. However, the pierced steel lot did show certain advantages over concrete lots. Some of these advantages were: the cattle adapted readily to the steel; the surface remained stable; the surface could be cleaned easily; the surface could be cleaned when concrete lots remained frozen; the lots were cooler than concrete lots during the warm months; the lots were dust free during dry seasons; and the lots could be easily remodeled by arranging the sections differently with a tractor. The price of the steel pierced lot varies as do other surfaces with each set of conditions. (Russell-East Central)
W75-04644

SETTLING BASIN DESIGN FOR RACEWAY FISH PRODUCTION SYSTEMS,
Georgia Univ., Athens. Agricultural Engineering Center.
J. L. Chesness, W. H. Poole, and T. K. Hill.
Paper No 74-5005 presented at the 1974 Annual Meeting of American Society of Agricultural Engineers, Oklahoma State University, Stillwater, June 23-26, 1974, 13 p, 3 fig, 5 tab, 8 ref.

Descriptors: *Settling basins, *Design, *Organic wastes, Fish, *Sedimentation, Recirculated water, Model studies, Effluent, Analysis, *Waste treatment.
Identifiers: *Raceway fish production systems, *Fish wastes.

A new type of fish production system is a flowing water culture of fish in a recirculating earthen raceway. This system produces substantial amounts of fish, but if production in this closed-loop system is to continue, techniques must be found for the removal of waste products. This study was undertaken to: (1) determine the quantity of solids and the settling characteristics of suspended solids; and (2) design and test a settling basin for the removal of these solids. A trapezoidal-shaped settling basin was designed. Field evaluations showed that the basin would remove about 48% of the filterable solids. This was 82% of the predicted removal efficiency, but only 6% of the total organic solids would be removed by sedimentation. This study indicates that effective removal of waste organics in warm water fish culture recirculating raceway systems cannot be attained by physical sedimentation alone. (Russell-East Central)
W75-04646

A BILL TO ASSURE SAFE DRINKING WATER.
For primary bibliographic entry see Field 6E.
W75-04652

LABORATORY STUDIES ON FEEDLOT RUNOFF,
Nebraska Univ., Lincoln. Dept. of Civil Engineering.
L. R. Christensen.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 676, $4.75 in paper copy, $2.25 in microfiche. MS Thesis, April, 1973, 77 p. 16 fig, 15 tab, 40 ref. OWRT A-027-NEB(1). 14-31-0001-3827.

Descriptors: *Farm wastes, Agricultural runoff, *Feedlots, Runoff, *Waste treatment, Coagulation, *Aeration, Chemical oxygen demand, Operations.

Laboratory studies, beginning in mid-September, 1971, and continuing through the summer of 1972, were made to determine the optimum operating conditions for an extended aeration system with air lift solids return. Treatment efficiencies were evaluated at relative equilibria of the monitoring parameters of MLSS, effluent SS, mixed liquor COD, effluent COD, and soluble effluent COD with respect to the influent waste COD and SS. Results showed that aerobic treatment with a forced solids return could operate at greater than 50 percent efficiency for both solids and COD removal at detention times as low as 2 days without additional treatment. It was concluded that feedlot runoff is amenable to aerobic treatment. (Cameron-East Central)
W75-04653

EVALUATION PROBLEM OF STORM WATER ROUTING MATHEMATICAL MODELS,
Societe Grenobloise d'Etude et d'Applications Hydrauliques (France).
J. A. Cunge.
Water Research, Vol 8, No 12, p 1083-1087, December 1974. 10 ref.

Descriptors: Evaluation, *Value engineering, *Mathematical models, Analytical techniques, Synthetic hydrology, Drainage systems, *Flood routing, *Storm water, *Sewers systems, *Storm drains.

The flood routing procedure is a key part of any mathematical model of a storm sewer system. Eventually the value of the whole model depends on it. The choice of the flood routing method among the several available should be made taking into account local situations and the ultimate aims of the simulation model. That decision may ultimately influence the sucess or failure of the actual sewer management system. Several alternative models were discussed. Municipal services should take an active part in any evaluation study as well as in the actual model building and calibrating. (Jess-ISWS)
W75-04708

LABORATORY STUDY OF CONTINUOUS ELECTROOXIDATION OF DILUTE CYANIDE WASTES,
Waterloo Univ. (Ontario). Dept. of Chemical Engineering.
J. J. Byerley, and K. Enns.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-235 588, $3.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Cincinnati, Ohio, Report EPA-670/2-74-059, p 39, October 1974. 5 fig, 27 ref, 3 append. EPA Project 12010 DOT.

Descriptors: *Industrial wastes, *Waste water treatment, *Chemical wastes, Water pollution control, Waste water disposal, Oxidation, Laboratory tests, *Electrochemistry, Water purification, Heavy metals, Water pollution sources.
Identifiers: *Cyanides, Metal finishing wastes, *Electrooxidation, Electroplating.

An experimental study was conducted to determine the feasibility of detoxifying dilute cyanide plating wastes by electrooxidation. Because of the toxicity of cyanide to aquatic and animal life and its detrimental effect on the operation of sewage treatment plants, in-plant treatment of dilute cyanide wastes is essential. Although successful processes have been developed for destroying cyanide in concentrated plating wastes, the economic feasibility of the electrolytic technique for treating dilute wastes has not been established. An electrochemical demonstration unit was developed for the treatment of dilute cyanide plating wastes. The cyanide and plating metal concentrations can be reduced to less than 1 ppm. Energy requirements vary according to the duty and mode of operation ranging from 40 KWhr to 140 KWhr/lbCN(-). (Humphreys-ISWS)
W75-04719

COMPREHENSIVE PLAN FOR WATER, SEWER AND STORM DRAINAGE IN THE LOWER RIO GRANDE VALLEY, (VOLUME II).
Nelson (B.L.) and Associates, Inc., Dallas, Tex.
Prepared for the Lower Rio Grande Valley Development Council, McAllen, Texas, September 1971. 112 p, 10 tab, 6 maps, 16 ref. HUD 701.

Descriptors: Water resources, *Water resources development, Flooding, *Drainage systems, Water management(Applied), *Rio Grande River, *Sewage, Waste water disposal, Channel improvement, *Comprehensive planning, Potential water supply, Regional development water poilcy, *Texas, Planning, Irrigation, *Storm drains.
Identifiers: Lower Rio Grande Valley(Tex), Cameron County(Tex), Hidalgo County(Tex), Willacy County(Tex).

This regional facilities plan has three sections: (1) outlines the existing situation for water, sewer and storm drainage facilities in each county, Cameron, Hidalgo, and Willacy, then describes the situations in individual communities; (2) discusses plans for both short range and long range development programs, including alternate means of financing; (3) suggests creation of a single Regional Authority to provide potable and irrigation water from the Rio Grande and recommends adoption of this plan. Water supply is primarily groundwater of mixed and mostly poor quality plus diversions from the Rio Grande River. Flooding from the Rio Grande combined with control and disposal of surface runoff creates serious problems. Drainage problems are so complex that comprehensive project type action is necessary. Many cities have outdated and inadequate sewage disposal systems with streams and ditches serving as residual waste carriers. For the short range period (5-10 years), increased water demands will necessitate highest priority being given to construction of water components where facilities are lacking or inadequate according to Health Department standards, establishment of regional sewage treatment subsystems, and construction of single-purpose and multi-purpose channels plus land treatment measures to protect and improve agricultural lands. In the long range (to 1990), water supply for domestic and industrial usage is expected to be a working combination of treated river water, treated well water, de-salinized water, re-cycled effluent, and imported water. Continued and systematic review of this Plan should be carried out to solve current problems and provide for future needs. (Hufschmidt-North Carolina)
W75-04759

ARE WE READY FOR A CLOSED SYSTEM OF WATER SUPPLY, TREATMENT, AND REUSE - TECHNOLOGY VS. PSYCHOLOGY,
Water Resources Bulletin, Vol 10, No 5, p 942-951, October, 1974. 4 tab, 6 ref.
J. C. Huang, and R. L. Smith, Jr.
Water Resources Bulletin, Vol 10, No 5, p 942-951, October, 1974. 4 tab, 6 ref.

Descriptors: Waste water treatment, Water management(Applied), *Potable water, *Psychological aspects, *Reclaimed water, Waste dilution, Attitudes, Water quality, Water utilization, Water consumption, *Water pollution, Recycling, Effluents, Environmental sanitation, Water purification, Water sources, Saline water, Treatment facilities, Domestic water, Public health, Africa, Technology, Water quality standards.
Identifiers: Psychological effects, Drinking water standards, Windhoek(S. Africa), South Africa.

Few totally closed systems of water supply, treatment, and reuse exist; in the United States, the Public Health Service discourages such practices. However, are there scientific reasons to support this disapproval, is psychological immaturity the factor, or are treatment technologies not yet available. In some arid areas or in island countries, direct resue of waste water is economically more attractive than desalination of ocean or brackish water. In Windhoek, South Africa, renovated waste water is used for drinking purposes and comprises 14% of the normal supply and over 40% of the supply in winter months. Technology exists to provide high quality effluent, through the use of lime and chlorine. Understanding of viral survival is still incomplete for some waste water treatment processes. Some scientists are also concerned about existing inadequate drinking water standards. Presently, much renovated waste water is first discharged into a receiving stream before it is withdrawn again for reuse; the stream then acts as a natural barrier. The public's psychological barriers still outweigh the technical credibility of reuse; education and encouragement are needed. (Grden-North Carolina)
W75-04761

COMPREHENSIVE WATER AND SEWER PLAN FOR ALAMANCE COUNTY, NORTH CAROLINA,
Freeman (William F.) Associates, High Point, N.C.
G. E. Freeman, H. B. Stokes, Jr., and C. J. Jones.
Prepared for Alamance County Board of Commissioners and Alamance County Planning Board. May, 1969. 46 p, 36 fig, 21 tab.

Descriptors: *Water supply, *Water sources, *Sewers, *Sewage, *Water supply development, Urbanization, Septic tanks, Combined sewers, Water resources, Water treatment, *North Carolina, Water requirements, Waste water treatment, *Comprehensive planning.
Identifiers: *Alamance County(N.C.), Haw River(N.C.).

Alamance County, in the Piedmont area of North Carolina, should construct an extensive water and sewer system to encourage continued growth. Major urban areas of Burlington, Graham, and their fringes with approximately half of the estimated population of 95,000 are excluded from the study area. Manufacturing in the county accounts for 71.9% of the labor force. Soil surveys show that over half of the county is not well suited for farming, and farming is a decreasing percentage of the county's income as the number of farms decreases. The rapid growth of a rural non-farm population is causing increased densities which are difficult to maintain on private wells and septic tanks, especially since over 50% of the soil in the county is poorly suited for septic tanks. In 1960, 12.8% of the dwelling units in the county had no piped water at all, and nearly 21% of the units were served by pits privys or had no toilet facilities. Existing water and sewer facilities are described for the half dozen area communities, including industrial plant systems which sell water to homes. Capacities and technologies in use are described. Water resources include poor ground water supplies and ample surface water, particularly the Haw River, which, with strict effluent controls, could be an important water source. Population projections indicate a need for an additional 10.4 million gallons per day by 1990. Needs in each community are outlined, and a $2.9 million project is proposed for water and sewer systems as a first phase of a more extensive system. (Herr-North Carolina)
W75-04765

RATIONAL BASIS FOR SEPTIC TANK SYSTEM DESIGN,
Connecticut Univ., Storrs. Dept. of Civil Engineering.
R. Laak, K. A. Healy, and D. M. Hardisty.
Ground Water, Vol 12, No 6, p 348-351, November-December 1974. 2 fig, 17 ref.

Descriptors: *Design, *Septic tanks, *Domestic wastes, *Sewage disposal, *Soil disposal fields, Hydraulic design, Percolation, Leaching, Ion transport, Groundwater, Phosphates, Nitrates, Nutrient removal, Water pollution sources, Water quality.
Identifiers: Biological clogging mat.

About 17 million families in the United States are served by septic tank and subsurface seepage systems. Rational design of these disposal systems includes three aspects. First, the system must be hydraulically sound. The flow regime and the storage and water carrying capacity of the receiving soil should be measured before design. A soil with a coefficient of permeability less than 0.0001 ft/min suggests, for example, that the hydraulic capacity of the system governs the size of the subsurface leaching field. Seasonally high water tables or impervious strata may retard the flow and reduce the quantity of wastewater that can be carried away from the subsurface disposal area. In this case an elevated bed can be designed to increase the potential hydraulic gradient. The second consideration concerns the biological mat in leaching fields. Leaching fields can be designed with higher loadings in soils having a coefficient of permeability greater than 0.0001 ft/min if increased pretreatment is used. A mathematical relationship was developed for reducng the size of leaching fields for effluents with a BOD5 plus suspended solids less than 250 mg/l. Leaching fields were projected to operate indefinitely. Long-term loading rates for different soil permeabilities were plotted on a graph that can be used for sizing fields. The third consideration concerns preservation of the groundwater quality. Concrete sand and silt with an unsaturated thickness of 1.5 feet still removed after 2 years of operation 30% of septic tank effluent phosphate and nitrogen. The effluent from the test soils had a concentration of about 13 mg/l phosphate and 15 mg/l nitrogen mostly in the NO3-N form. (Gibb-ISWS)
W75-04801

SIMPLIFIED APPLICATION OF PALMER-BOWLUS FLOW METERS,
ENCIBRA South America, Sao Paulo (Brazil).
For primary bibliographic entry see Field 8B.
W75-04802

HYDRAULIC ANALYSIS OF WINNIPEG SUMP INLETS,
Manitoba Univ., Winnipeg. Dept. of Civil Engineering.
K. M. Adam, and N. B. Brandson.
Journal Water Pollution Control Federation, Vol 46, No 12, p 2755-2763, December 1974. 7 fig, 4 ref, 1 append.

Descriptors: *Intakes, *Design data, *Discharge coefficient, *Laboratory tests, Discharge(Water), Storm water, Hydraulics, Storm drains, Urban runoff, Measurement, *Canada, Flow, Slopes, Weirs.
Identifiers: *Street drainage, Curb inlets, Gutter inlets, *Winnipeg(Manitoba).

Full-scale tests were run on a model of inlets of the types installed in the city of Winnipeg, Manitoba. The four types of inlets tested were the undepressed curb inlet, the depressed curb inlet, the undepressed gutter inlet, and the undepressed combination inlet. All tests were for the 'sump condition' or inlets located at the low point of a sag vertical curve. Gutter slope was varied for each case. The discharge data for each case was empirically fitted to an equation of the form Q equals C times y to the n power. Values of C and n were presented graphically as functions of the gutter slope for each inlet type. Comparisons with previous studies were also made and discussed. (Adams-ISWS)
W75-04804

SOURCES OF METALS IN NEW YORK CITY WASTEWATER,
New York City Dept. of Water Resources. Industrial Wastes Control Section.
For primary bibliographic entry see Field 5B.
W75-04805

TRACE METALS IN WASTEWATER EFFLUENTS,
University of Southern California, Los Angeles. Environmental Engineerig Program.
For primary bibliographic entry see Field 5B.
W75-04806

UNIFORM DISTRIBUTION IN SOIL ABSORPTION FIELDS,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
R. J. Otis, J. Bouma, and W. G. Walker.
Ground Water, Vol 12, No 6, p 409-416, November-December 1974. 7 fig, 1 tab, 11 ref.

Descriptors: *Soil disposal fields, *Domestic wastes, *Septic tanks, Pathogenic bacteria, Water pressure, Infiltration, Absorption, Moisture content, Field capacity, Flow rates, Soil moisture, Soil water, Waste water disposal, Water reuse.
Identifiers: Pressure distribution system.

The function of a septic tank-soil absorption system is to purify the wastewater discharged from the home before reaching the groundwater. However, failure often occurs in the soil absorption field. Failure can originate from two causes: (1) inadequate infiltration of effluent into the soil, and (2) inadequate purification in the soil during percolation because of short travel times. Failures of the second type can be prevented through proper design and operation of the soil absorption field. Uniform distribution of the septic tank effluent over the entire soil absorption field is necessary to maintain the soil's efficiency for pathogenic organism removal. (Gibb-ISWS)
W75-04807

SPECIAL METHODS OPEN STORM-BLOCKED PIPELINE.
For primary bibliographic entry see Field 8C.
W75-04808

PRECOAT FILTRATION ON ROTARY VACUUM FILTER (PRECOAT-FILTRATION AUF DEM VAKUUM-TROMMELFILTER),
H. Berndt.
Aufbereitungstechnik, Vol 15, No 3, p 137-140, November 3, 1974. 5 fig, 11 ref. (English Summary).

Descriptors: *Filtration, *Waste water treatment, Separation techniques, *Filters, Water treatment.
Identifiers: *Precoat filters, *Rotary vacuum filter, Filter cake removing device, Stationary filter tanks, Filter drums.

A pre-coat filter, which was developed from the rotary vacuum filter, operates continuously to filter suspensions by utilization of gas pressure. The filter includes the stationary filter tank where

the suspension is introduced, the filter drum, provided with filter cells subdivided by the chamber division strips, the control valve, the swinging agitator, the filter cake removing device, and the driving mechanism. The pre-coat filter may consist of various materials. A detailed description of the pre-coat filtration process is presented. Pre-coat filtration on the rotary vacuum filter permits the separation of suspensions which are unable to be separated into the solid and liquid phase by other conventional continuous filtration processes. (Leibowitz-FIRL)
W75-04810

TERTIARY TREATMENT: THE WRONG SOLUTION TO A NON-PROBLEM,
Las Virgenes Municipal Water District, Calabasas, Calif.
H. W. Stokes, and L. D. Hedenland.
Civil Engineering-ASCE, Vol 44, No 9, p 86-89, September, 1974. 1 fig.

Descriptors: *Waste water treatment, *Activated sludge, *Tertiary treatment, *Design criteria, *Operation and maintenance, Biochemical oxygen demand, Treatment facilities, Suspended solids, Heavy metals, Nutrient removal, Water quality control, Biological treatment, Nitrogen, Phosphorus removal, Bacteria, Viruses.

Design criteria and operating techniques are suggested that allow higher levels of BOD removal than those generally thought to be possible with activated sludge treatment. The Tapia Water Reclamation Plant, California, reliably achieves 98 percent BOD and suspended solids removal by optimizing the secondary treatment. The process design for this plant is given. It covers: primary treatment; aeration system; process air requirements; secondary sedimentation tanks; chlorine contact tanks; reaeration tanks; aerobic digestion; and, designed effluent quality criteria. The most important parameters for precise operation are aeration control through the use of nitrate nitrogen profiles, precise daily solids balance of the aeration system, and constant activated-sludge return rate. A secondary sludge plant that can produce 98 percent BOD removal and nitrify the ammonia, will have an effluent that contains almost no colloidal material, should not need filtering, and will have a turbidity of less than one Jackson Unit. A properly designed and operated secondary treatment (activated sludge) plant can adequately remove suspended solids, BOD, ammonia, coliform, and virus. Tertiary treatment is needed only to remove the heavy metals, phosphorus and nitrate-nitrogen. (Orr-FIRL)
W75-04811

AMMONIA DESORPTION BY DIFFUSED AERATION,
Cornell Univ., Ithaca, N.Y. Agricultural Waste Management Program.
E. G. Srinath, and R. C. Loehr.
Journal Water Pollution Control Federation, Vol. 46, No 8, p 1937-1957, August, 1974. 12 fig, 2 tab, 18 ref.

Descriptors: *Nitrogen, *Aeration, *Waste water treatment, Ammonia, *Waste water(Pollution), Air-water interfaces, Temperature, Viscosity, Mathematical models, Hydrogen ion concentration.
Identifiers: *Ammonia desorption.

The removal of nitrogen from waste water is becoming increasingly important. Since nitrogen in untreated waste water exists as ammonium nitrogen, ammonia desorption is a viable method of nitrogen control. Theoretical considerations to predict ammonia desorption from water and waste water, experiments on removal of ammonia from waste water by diffused aeration, and predictive equations relating ammonia desorption efficiency to environmental and process conditions are discussed. The quantity of ammonia desorbed from a solution depends on the concentration of undissociated ammonia, the gas-liquid surface area, the mass-transfer coefficient, and the partial pressure exerted by ammonia in the gas phase. The rate of diffusion is influenced by pH, temperature, and viscosity. The equations presented allow better estimates of the ammonia loss from artificial and natural aerated systems to be made. Equations were developed to determine the ammonia desorption coefficient under quiescent and aerated conditions and to determine the quantity of ammonia lost under various environmental conditions. (Orr-FIRL)
W75-04812

BUBBLE SIZE AND CONTACT TIME IN DIFFUSED AERATION SYSTEMS,
Windsor Univ. (Ontario). Dept. of Civil Engineering.
D. S. Mavinic, and J. K. Bewtra.
Journal Water Pollution Control Federation, Vol 46, No 9, p 2129-2137, September 1974. 7 fig, 4 ref.

Descriptors: *Aerobic treatment, *Bubbles, *Activated sludge, *Aerated lagoons, *Aeration, Sewage treatment, *Waste water treatment, Flow, Water circulation, Pumping.

One of the most common ways of supplying oxygen to aeration basins is by diffused bubble aeration. The contact time of air bubbles with the liquid is one of the most important parameters influencing the efficiency of diffused bubble aeration. The procedure for determining bubble contact time, ways to increase this time, and the effects of different parameters on this time are discussed. Four systems were observed: a simple column of water; water circulation and an upward cocurrent air-water flow caused by diffused air; water circulation and counter-current air-water flow caused by pumping; and, water circulation and downward cocurrent air-water flow caused by pumping. The unit contact time in each system was dependent on the air flow rate and the unit contact time decreased with an increase in air flow. The unit contact time is independent of the depth for the first three systems. The total contact time will increase almost linearly with the diffuser submergence. System three (water circulation and counter-current air flow caused by pumping) provides the highest unit contact time. This is caused by the slowing of the air bubbles by countercurrent air-water flow. (Orr-FIRL)
W75-04813

WASTEWATER ANALYSIS AND ITS RELATION TO COMPANY PROFITS,
Harnish and Lookup, Associates, Newark, N.Y.
For primary bibliographic entry see Field 5A.
W75-04817

SPHERE METHOD TURBIDIMETER,
Nippon Precision Optical Instrument, Co. Ltd., Tokoyo (Japan).
For primary bibliographic entry see Field 5A.
W75-04819

TURBIDITY REMOVAL USING POLYMERS AND ACTIVATED CARBON,
Purdue Univ., Lafayette, Ind.
For primary bibliographic entry see Field 5F.
W75-04820

APPLICABILITY OF CONTROL STRATEGIES TO THE ACTIVATED SLUDGE WASTEWATER TREATMENT PROCESS,
Purdue Univ., Lafayette, Ind.
R. F. Lech.
PhD Thesis, 1973, 279 p.

Descriptors: *Activated sludge, *Waste water treatment, Evaluation, *Model studies, *Control systems, *Performance, Design criteria.
Identifiers: Feedforward, Feedback.

The potential improvements to be gained by the addition of control systems to the activated sludge waste water treatment process are evaluated. Approximate models for the important transfer functions in the process are developed. The applicability of single and multiple-loop feedback control systems is evaluated on activated sludge plants characterized by two types of final settler behavior. The most significant improvement in performance is achieved by feedforward and combinations of feedforward and feedback control systems among all the control systems considered. The applicability of control strategies is limited by the design of the process. (Sandoski-FIRL)
W75-04822

SEWAGE TREATMENT IN THE POTTERIES,
Taylor (John) and Sons (England).
P. A. Banks.
The Consulting Engineer, Vol 38, No 7, p 41, 44, 45, July 1974. 4 fig.

Descriptors: *Waste water treatment, *Sewage treatment, *Water pollution, *Water quality management, *Municipal water, Industrial wastes, Effluent control, Rivers, Coal mine wastes.
Identifiers: *Preliminary treatment, Link sewer, Clay pits, Slag heaps.

At Stoke-on-Trent, Great Britain, a new sewage treatment plant is being completed to help the redevelopment of Stoke into a city with an expanded economy with a larger range of social and municipal services. The reclamation work on derelict clay pits and slag heaps has fostered redevelopment in industrial towns within their boundaries. The Strongford sewage works on the River Trent is an extension of a plant first constructed on the southern city boundary in 1930. A policy of centralization of sewage treatment resulted in the reduction of the number of works maintained in the general area and the transfer of flow to Strongford. The plan to close the Hanley works and three other smaller works necessitated a sewer 2 m in diameter for the transfer of up to six times the dry weather flow 5 miles south. A scheme to route the link sewer was developed according to an assessment of the subsidence risk arising from two active coal mines in that area. The works require a high effluent standard, including preliminary treatment units and primary sedimentation arranged in two inter-connected streams. (Leibowitz-FIRL)
W75-04823

ACTIVATED SLUDGE BULKING (IN JAPANESE),
K. Sona, and S. Kyushin.
Kemikaru Enjiniyaringu, Vol 19, No 7, p 37-41, July 1974. 6 fig, 2 tab, 12 ref.

Descriptors: *Activated sludge, *Bulk density, *Settling basins, Nutrients, Biochemical oxygen demand, Chlorination, Pre-treatment, Temperature, *Waste water treatment.
Identifiers: *Bulking, Mixed liquor suspended solids(MLSS).

The sedimentation ability of activated sludge and bulking, the causes of bulking, the hypothetical mechanism of filamentous bulking, and countermeasures for bulking are discussed. In an operating aeration tank, the maintaining of MLS (mixed liquor suspended solid) concentration at an appropriate level and the BOD load at a relatively low level (usually less than 0.3 kg BOD/kg MLSS/day) is important. The ratio of nutrients in the sludge is important, and if the ratio of carbon/nitrogen increases, the amount of carbohydrates in bacteria will increase; one way of preventing bulking is to add enough nitrogen. Chlorine is deleterious to filamentous fungi rather than to Zoogloea, and the addition of about 0.3-0.6 percent (to dry sludge weight) in the return sludge can improve the settling of bulking sludge greatly. To prevent other deleterious effects, chlorine

must be carefully measured. Intermittent adding of other oxidizing agents such as hydrogen peroxide is reported to be effective; the limits are 20-400 ppm, but less than 20 ppm will be ineffective and over 400 ppm will cause partial deflocculation. Radical changes in the quantity and composition of waste water flow will induce bulking; for this reason, a pre-treatment of water is desirable. The type of pre-treatment will affect the efficiency of activated sludge greatly. The low temperature of aeration tank water can cause bulking both by an increase of carbohydrate at a lower temperature. An intermittent fill and draw method of waste water flow has been successful in preventing bulking. (Seigle-FIRL)
W75-04824

COAGULATION-FILTRATION PRACTICE AS RELATED TO RESEARCH.
American Water Works Association, New York. Committee on Research.
Journal of the American Water Works Association, Vol. 66, No. 8, P 502-503, August 1974. 24 ref.

Descriptors: *Coagulation, *Filtration, *Flocculation, *Sedimentation, Water pollution, *Water treatment, Algae, Activated carbon, Turbidity, Zeta potential, *Waste water treatment.
Identifiers: *Filterability tests, Pilot-filter monitoring, Residual-coagulant analysis, Electrophoretic mobility, Jar test.

In the field of water treatment, clarification generally means the solids-liquid separation process which may include coagulation, flocculation, sedimentation, and filtration. Filtration is merely one step in the total process. The laboratory jar test is the conventional method for determining the optimum coagulent dosage for plant operation. Plants with expert staff may also employ zeta potential measurements, filterability test, pilot-filter monitoring, residual-coagulant analyses, or interfacial-turbidity monitoring. The jar test is limited because of the subjective nature of the floc evaluation and the difficulty of duplicating conditions of water being treated in a plant. The filterability of a floc is a measurable property of the raw water, the equipment, or the floc itself. Iron flocs filter best near the isoelectric point of the floc. The efficiency of removal of negatively charged clay particles was improved by charging the surface of sand columns electropositively. The turbidity removal improves with increased electrophoretic mobility of suspended clay materials; coagulating chemicals are required in the influent to a filter for the removal of algae and particles of activated carbon. (Leibowitz-FIRL)
W75-04825

SOLID ADSORBENTS FOR GAS AND LIQUID TREATMENT,
Grace (W.R.) Australia Ltd., Melbourne. Davidson Chemicals Div.
P. E. Pick.
Process and Chemical Engineering (PACE), Vol 27, No 6, p 23-27, June, 1974. 3 fig, 2 tab.

Descriptors: *Silica gels, Gases, *Liquid wastes, *Separation techniques, Purification, *Dehydration, Ziolites, Water pollution, *Waste water treatment.
Identifiers: *Solid adsorbents, *Gas and liquid treatment, Silicon dioxide, Amorphous polymeric structures, Extrusion process, Molecular sieves.

Solid adsorbents such as silica gel and the synthetic or naturally occurring zeolites called molecular sieves can be utilized in the purification, separation and dehydration of gases and liquids. Davison gel, a pure form of silicon dioxide (99.7 percent SiO_2), which is made under carefully controlled conditions from sulphuric acid and sodium silicate results in an amorphous polymeric structure with the following percentage composition: Si as SiO_2, 99.7; Fe as Fe_2O_3, 0.03; Al as Al_2O_3, 0.10; Ti as TiO_2, 0.09; Ca as CaO, 0.01; Na as Na_2O, 0.02; Zr as ZrO_2, 0.01; trace elements, 0.03. This structure consists of beads with pores with a diameter ranging from 20-40 A. The pore size and particle sizes can be determined by controlling the reaction conditions during their manufacture, with the granules being sieved into particle-size ranges. An extrusion process is used in the formation of bead form silica gel. The result is a pure, chemically inert material which is structurally strong with a high attrition resistance. The total surface area will range around 700-800 sq m/g, depending upon pore size. Silica gel has a great affinity for water, and can hold 40-100 percent of its weight as water. It can adsorb organic molecules, with the selectivity order based on polarisability, degree of unsaturation and volatility. This gel can be utilized in the dehydration of air, carbon dioxide, natural gas, alcohol mixtures, aromatics like benzene, and for chromatographically separating organic fractions. (Leibowitz-FIRL)
W75-04826

ENVIRONMENT, ENERGY COSTS SUGGEST OXYGEN ACTIVATED SLUDGE AS WASTE-WATER TREATMENT APPROACH,
R. J. Kulperger.
Professional Engineer, Vol 44, No 10, p 29-31, October, 1974. 4 fig.

Descriptors: Activated sludge, *Oxygenation, *Aeration, Costs, Energy, Power, Dissolved oxygen, Secondary treatment, *Waste water treatment.
Identifiers: *UNOX System.

The UNOX System technology for an oxygen-activated sludge system for waste water treatment is currently used by 125 treatment plants in several countries. The system consists of a covered, staged aeration or oxygenation basin where oxygen rather than air is used as the aerating gas. Feed oxygen, waste water and return sludge all flow through the basins in the same direction. High dissolved oxygen levels (4 to 8 mg/liter) and high solids levels (4000 to 8000 mg/liter) are maintained in the oxygenation basin. Treatment time is reduced and the system possesses high stability to shock organic loads. The costs of energy and power in recent years have escalated, and the UNOX System has an economic advantage in terms of power usage. Total power to operate an oxygen activated sludge system compared to a diffused air system will be reduced from 30 to 50 percent. For example, in Detroit, Michigan, both types of plants are operated and the relative annual operating costs of the UNOX System showed a savings of $311,500 per year, most of which is the result of reduced power usage. In addition, the ability of a system to turn down in response to organic loads imposed on the plant is an important factor, relative to power usage. The typical UNOX System reduces average consumption by 20 percent, calculated by the early design years of a plant plus diurnal variations at full plant load. At 1.5 cents per KWH, 100 Hp costs over $10,000 per year. The amount of land required for oxygen-activated sludge systems is also less than that of air diffusion systems because of the reduced sewage residence time. The residence time is reduced because of the high mixed liquor concentrations maintained in oxygenation basins. With increases in power costs, and decreases in available land, this method is a viable alternative to traditional air systems for secondary waste water treatment. (Prague-FIRL)
W75-04827

UPDATING AGING SEWERS WITHOUT TRENCHING,
Cliffside Pipelayers, Scarborough (Ontario).
H. S. St. Onge.
Engineering and Contract Record, Vol 87, No 7, p 40-41, 44, July, 1974.

Descriptors: *Sewers, *Plastic pipes, Pipelines, Materials, Construction, Maintenance, *Canada, Waste water treatment.
Identifiers: *Reaming, Pipe repairs.

Technology for sewer renewal without excavation costs less, avoids public nuisance such as construction noise and inconvenience, and prevents problems of damage to gas and water lines. Major causes of trouble in sewers are protruding laterals, calcite buildup, and root infestation obstructions which reduce cross-sectional area and produce turbulent flow, as well as deterioration of the pipe walls. In the city of Toronto, a reaming operation was designed to increase pipe flow capacity by first removing obstructions. Renewal is effected by using inserted close-tolerance polyethylene pipe. A video-reaming technique was successful; the operator of the reamer could observe, on closed circuit television, the size and shape of objects encountered in order to pull and cut with the proper amount of pressure. Once reaming is complete, the length of sewer is cleaned with a high pressure jet spray vehicle; the close fitting pipe is pulled by a vibrating nose cone; and the plastic liner is inserted by means of a hydraulic power winch truck positioned over a manhole. A final process involves remote lateral cutting and grouting to insure leakproof connections. (Prague-FIRL)
W75-04828

MORE THAN A MYRIAD.
Engineers Notebook, No 173, p 355-356, August, 1973.

Descriptors: *Waste water treatment, *Outfall sewers, *Municipal wastes, Waste treatment, Construction, Pipes, Materials, Equipment, Installation, Concrete pipes, *Australia.
Identifiers: Neoprene joint seals, Melbourne(Aust).

The metropolitan sewage system of Melbourne, Australia has been expanded to include a modern waste treatment plant southeast of the city. As part of the pollution controls, an effluent outfall line was constructed to discharge purified effluent from the plant to the ocean. Construction of this line involved 35 miles of trenching, manufacture of an equivalent length of large-diameter concrete pipe sections, installation, backfilling, and landscaping. Joint seals of Neoprene for the 90 to 100 inch diameter outfall pipe sections were chosen because of Neoprene properties of long-term retention of resilience and sealing integrity. Special pipe sections were designed where topography necessitated bends in the line. When the system is fully operable, it will serve 175 square miles and handle 50 million gallons of waste water per day. (Prague-FIRL)
W75-04829

KINETICS IN OZONE TREATMENT OF SECONDARY SEWAGE EFFLUENTS, (IN JAPANESE),
T. Goda, O. Kawahara, and M. Eda.
Gesuido Kyokai-shi, Vol 11, No 123, p 41-49, August, 1974. 20 fig, 3 ref.

Descriptors: *Ozone, *Sewage treatment, Effluents, Models, Biochemical oxygen demand, Chemical oxygen demand, Absorption, Filters, Measurement, *Waste water treatment.
Identifiers: *Japan, COD removal.

The absorption of ozone in water, the autodegradation of ozone, and the oxidation of ozone are some phenomena not yet satisfactorily explained. As a basic study for the ozone treatment of secondary treatment liquid waste, the question of kinetics was examined. The experimental apparatus consisted of a batch bubble tower which was made of an acryl cylinder with a glass filter at the bottom where ozone from the ozone producer was supplied. The liquid and

ozone were contacted there. The emitted ozone was measured between the bubble tower and emission exit. The test liquid sample was taken every hour for 24 hours from the secondary treatment water of a Kyoto sewage treatment plant; from four time belts, equal amounts were taken and a composite test material was prepared. The water was filtered to remove suspended substances before the ozone treatment. The measurements were taken for BOD5, COD(Cr), COD(Cr) removal speed, ozone consumption/COD removal, and BOD5/COD(Cr). The COD(Cr) removal process was satisfactorily explained by a hypothetical model for multiple reactions of different speeds and an equation induced from COD removal speed data. The relationship between ozone consumption and COD removal was experimentally confirmed to be about 2, and the ratio increase with the progress of treatment was theretically clarified. The initial five minutes of BOD5 increase had a correlation with COD(Cr) removal. (Seigle-FIRL)
W75-04831

SYMPOSIUM ON ANIMAL WASTE MANAGEMENT.
Held at USDA Southwestern Great Plains Research Center, Bushland, Texas, January 18, 1973. 50 p, (1973), 11 fig, 8 tab, 21 ref.

Descriptors: *Farm wastes, *Waste water treatment, *Waste disposal, Recycling, Feed lots, Cattle, Nutrients, Nitrogen, Salts.
Identifiers: *Land spreading.

This symposium was held to consider the problems of animal waste management, particularly in relation to beef cattle. Animal waste treatment and disposal were discussed in terms of recycling and land disposal. Various forms of recycling, i.e., refeeding, creating fuels, etc., are still largely experimental and in most cases are not yet feasible. While land spreading offers a much used means of waste disposal, over-supply of nutrients in the soil is a possible hazard. Research is still needed for development of non-polluting feasible means of disposing of animal wastes. (See W75-04833 thru W75-04836) (Merryman-East Central)
W75-04832

EFFECTS OF CATTLE FEEDLOT MANURE ON CROP YIELDS AND SOIL CONDITIONS,
Southwestern Great Plains Research Center, Bushland, Tex.
A. C. Mathers, B. A. Stewart, J. D. Thomas, and B. J. Blair.
In: Symposium on Animal Waste Management, held at USDA Southwestern Great Plains Research Center, Bushland, Texas, January 18, 1973, p 1-13, (1973). 6 fig, 1 tab.

Descriptors: *Feed lots, *Cattle, *Farm wastes, *Waste disposal, *Crops, Nitrogen, Salts, Rates of application, Soil profile.
Identifiers: *Soil conditions, Land spreading.

One to three years data suggest that manuare applications of ten tons per acre furnish adequate nitrogen for most crops without creating high salt buildup in the soil. Also, applications of ten tons per acre do not affect organic levels of the soil. Higher rates of manure can be added to soil without lowering yields, but nitrate and salts accumulate, eventually hampering crop yields. This problem can usually be alleviated by deeper plowing depths. At just ten tons per acre, land area in even the most concentrated feeding areas is adequate to dispose of manure. In fact, only one-fourth of the grain sorghum cropland in Texas along would have to be treated to dispose of the manure. The challenge is to develop distributing and handling systems to spread the manure on croplands most beneficially. (See also W75-04832) (Russel-East Central)
W75-04833

EFFECT OF RATION ON MANURE SALT CONTENT,
Texas Tech Univ. Center at Amarillo, Pantex.
R. H. Klett.
In: Symposium on Animal Waste Management, held at USDA Southwestern Great Plains Research Center, Bushland, Texas, January 18, 1973, p 26-31, (1973). 2 tab, 8 ref.

Descriptors: *Diet, *Salts, *Farm wastes, Cattle, Livestock, Feed lots, Performance, Waste treatment, Water pollution sources.
Identifiers: Ration, *Waste management, Sodium levels, Excretion.

Experimental data illustrate that excessive levels of salt obtained from the diet are excreted and tend to serve no useful purpose for the nutrition of feedlot steers. Data also suggest that levels of sodium in the form of NaCL could be reduced below those normally recommended for feedlot rations without effect on annual performance. In other words, the correct amount of salt is the amount that is utilized by the animal. The excess salt serves no useful function. Also, reducing feeding levels of salt will result in lower levels of salt in solid-waste and will allow higher incorporation of manure into the soil as fertilizing material. (See also W75-04832) (Russel-East Central)
W75-04834

AMOUNTS, COMPOSITION, AND MANAGEMENT OF FEEDLOT RUNOFF,
Southwestern Great Plains Research Center, Bushland, Tex.
R. N. Clark, and B. A. Stewart.
In: Symposium on Animal Waste Management, held at USDA Southwestern Great Plains Research Center, Bushland, Texas, January 18, 1973, p 32-42, (1973). 3 fig, 2 tab, 6 ref.

Descriptors: *Runoff, *Feed lots, Chemical composition, Sampling, Seepage, Evaporation, Stocking, Moisture content, Playas, Salinity, Irrigation, *Management, Waste treatment.
Identifiers: *Waste management.

Runoff amounts and concentrations were measured from a Texas High Plains cattle feedlot at Bushland. The graphic relationship between rainfall and runoff for runoff-producing storms was linear with about one-third of the rainfall ending up as runoff. Concentrations of runoff constituents were higher than those found for cattle feedlots elsewhere. This was probably due to high evaporation and high stocking rates which result in lots containing more salt. Soil moisture samples indicated that there was no significant seepage which would pollute ground water from playas or lots. Before runoff could be used for irrigation there would have to be a dilution of about four parts well water to one part feedlot runoff. This dilution would reduce salinity below levels hazardous to crops. Any use of feedlot runoff for irrigation required a close watch on salts in the water and soil. (See also W75-04832) (Russel-East Central)
W75-04835

FUTURE DEVELOPMENTS IN FEEDLOT WASTE MANAGEMENT,
Texas Agricultural Extension Service, College Station.
J. M. Sweeten.
In: Symposium on Animal Waste Management, held at USDA Southwestern Great Plains Research Center, Bushland, Texas, January 18, 1973, p 43-50, (1973). 7 ref.

Descriptors: *Feed lots, *Farm wastes, Water pollution, Recycling, Fuels, Oxidation, Odor, Runoff, Air pollution, Design, Slurries, Legal aspects, Waste treatment.
Identifiers: *Waste management, Land disposal, Refeeding, Pyrolysis, Composting, Soil conditioners.

With rapid progress being made toward abating water pollution and with the benefits and safety of land disposal of feedlot manure, remaining problems of feedlot waste management will primarily entail developing more efficient and odor-free methods of managing solid manure and polluted runoff. Recycling waste as feed offers one method, but the Food and Drug Administration has banned this method for lack of research. Many other recycling methods such as developing manure into fuel oil have been suggested. But, at the present, these methods are economically unfeasible. Perhaps one of the most restricting problems of waste management is odor. This problem has a variety of possible solutions, but most incorporate improved feedlot design. Once the problems have been satisfactorily solved or bypassed, feedlot waste management will no longer be a pollution control issue but an economic one. (See also W75-04832) (Russel-East Central)
W75-04836

MECHANICAL AERATION OF A WASTE DISPOSAL MANURE PIT,
L. V. Ellis, and R. M. George.
Paper No 73-5545 presented at 1973 Winter Meeting, American Society of Agricultural Engineers, Chicago, Illinois, December 11-14, 1973, 6 p. 2 fig, 4 ref.

Descriptors: *Aeration, *Waste treatment, *Waste disposal, Mechanical equipment, Liquid wastes, Odor, Costs, Waste storage.
Identifiers: *Milking machine compressor.

A swine producer in Johnson County, Missouri uses a milking machine compressor unit to bubble air through the liquid manure holding pits. Complete design for the system is given. The final results of this experiment are not known at this time, but the producer wants to continue with this system of aerating his manure pits. Offensive odors have been greatly reduced in the pits, the building, and from the effluent when it is spread on fields. The solids in the pits are broken up and held in suspension. Good response in the form of plant growth, was obtained when the manure was spread on fields. Operating costs are small; electricity costs about 3 cents an hour. If the unit operates for 16 hours in 24 hours, the cost is about 48 cents per day. (Cartmell-East Central)
W75-04841

UNIVERSAL DESIGN OF A 2.5 MGD UNIVERSAL DESALTING PLANT, REVISED: VOLUME 1.
Burns and Roe, Inc., Oradell, N.J.
For primary bibliographic entry see Field 3A.
W75-04850

5E. Ultimate Disposal Of Wastes

RETRIEVABLE SURFACE STORAGE FACILITY, ALTERNATIVE CONCEPTS ENGINEERING STUDIES.
Atlantic Richfield Hanford Co., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04401

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES.
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04402

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 1-3: SUMMARY, BACKGROUND AND DATA BASE, AND EVALUATION METHODOLOGY.
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.

W75-04403

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 4: GEOLOGIC DISPOSAL.
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04404

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 5: ICE SHEET DISPOSAL,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04405

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 6: SEABED DISPOSAL,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04406

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 7: WASTE PARTITIONING,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04407

HIGH-LEVEL RADIOACTIVITY WASTE MANAGEMENT ALTERNATIVES - SECTION 8: EXTRATERRESTRII DISPOSAL,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04408

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES - SECTION 9: TRANSMUTATION PROCESSING,
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04409

A BALANCED APPROACH TO RESOURCE EXTRACTION AND CREATIVE LAND DEVELOPMENT ASSOCIATED WITH OPEN-PIT COPPER MINING IN SOUTHERN ARIZONA,
For primary bibliographic entry see Field 5G.
W75-04510

DESIGN, CONSTRUCTION AND LAUNCHING OF A SUBMARINE OUTFALL SEWER AT WHITSTABLE,
Whitstable Urban District Council(England).
For primary bibliographic entry see Field 5D.
W75-04536

A PROTOTYPE SYSTEM TO RENOVATE AND RECYCLE SWINE WASTES HYDRAULICALLY,
Iowa State Univ., Ames.
For primary bibliographic entry see Field 5D.
W75-04542

COPROLOGY: A POLLUTION SOLUTION,
Ohio State Univ., Columbus.
For primary bibliographic entry see Field 5D.
W75-04545

FERTILITY,
For primary bibliographic entry see Field 5D.
W75-04550

INDIANA POULTRYMEN ARE COMPOSTING POULTRY MANURE,
Purdue Univ., Lafayette, Ind.
For primary bibliographic entry see Field 5D.
W75-04552

THE SOCIAL REDEMPTION OF PURE GARBAGE,
For primary bibliographic entry see Field 5D.
W75-04553

ENERGY NEEDED TO MANAGE ANIMAL WASTE.
For primary bibliographic entry see Field 5D.
W75-04554

PERPETUAL-MOTION RECYCLING, OR, PIG MANURE INTO FISH FOOD,
For primary bibliographic entry see Field 5D.
W75-04555

RECYCLE ORGANIC WASTES AS FEED FOR MEAT ANIMALS.
For primary bibliographic entry see Field 5D.
W75-04556

COMPARATIVE CHANGES IN SOIL-PHYSICAL PROPERTIES INDUCED BY ADMIXTURES OF MANURES FROM VARIOUS DOMESTIC ANIMALS,
California Univ., Davis.
For primary bibliographic entry see Field 2G.
W75-04602

CONTROL OF POLLUTION FROM ANIMAL FEEDLOTS AND REUSE OF ANIMAL WASTES,
Committee on Government Operations (U.S. House).
For primary bibliographic entry see Field 5D.
W75-04615

DEVELOPMENT OF AN ORGANIC WASTE SLURRY INJECTOR,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W75-04616

TAILOR MADE CONFINEMENT BARN,
For primary bibliographic entry see Field 5D.
W75-04617

NEW AEROBIC PROCESS TURNS WASTE TO NUTRIENTS,
For primary bibliographic entry see Field 5D.
W75-04619

NUTRIENT RECOVERY: NEW CONCEPT IN WASTE HANDLING,
For primary bibliographic entry see Field 5D.
W75-04620

TEST SWINE WASTE DISPOSAL SYSTEMS,
Iowa State Univ., Ames.
For primary bibliographic entry see Field 5D.
W75-04637

PNEUMATIC TRANSPORTATION OF MANURE,
All-Union Research Inst. of Cattle-breeding, Podolsk (USSR).
For primary bibliographic entry see Field 5D.
W75-04641

CHANGING FROM DUMPING TO RECYCLING. PART 2. ORGANIC WASTES,
California Univ., Berkeley. Sanitary Engineering Research Lab.
For primary bibliographic entry see Field 5D.
W75-04642

THE DISPOSAL OF RADIOACTIVE WASTES INTO THE SEA: SOME INTERNATIONAL LEGAL CONSIDERATIONS,
For primary bibliographic entry see Field 6E.
W75-04769

WILL CURRENT RESEARCH ANSWER TODAY'S PROBLEMS AT THE SANITARY LANDFILL.,
Auburn Univ., Ala. Water Resources Research Inst.
For primary bibliographic entry see Field 5B.
W75-04800

MORE THAN A MYRIAD.
For primary bibliographic entry see Field 5D.
W75-04829

SYMPOSIUM ON ANIMAL WASTE MANAGEMENT.
For primary bibliographic entry see Field 5D.
W75-04832

FUTURE DEVELOPMENTS IN FEEDLOT WASTE MANAGEMENT,
Texas Agricultural Extension Service, College Station.
For primary bibliographic entry see Field 5D.
W75-04836

MECHANICAL AERATION OF A WASTE DISPOSAL MANURE PIT,
For primary bibliographic entry see Field 5D.
W75-04841

5F. Water Treatment and Quality Alteration

INSTRUMENTATION IMPROVES WATER TREATMENT PLANT OPERATION,
Water and Sewage Works, Vol 121, No 6, p 96-99, June, 1974. 1 fig, 4 tab.

Descriptors: *Instrumentation, *Water analysis, *Optimization, *Operations, *Costs, Performance, Testing, Turbidity, Color, Hydrogen ion concentration, Spectrophotometry, Colorado.
Identifiers: Jar tests, Loveland(Colo).

Water analysis at the Loveland, Colorado water plant used jar tests in conjunction with a laboratory turbidimeter and a very sensitive spectrophotometer to indicate optimum operation and lowest overall costs. Clarification equipment, load conditions, and key water quality tests, such as turbidity, color, and pH, were studied most. The data were then examined for cause and effect relationships which suggested optimum feed rates or equipment changes. (Sandoski-FIRL)
W75-04434

CLOSED-LOOP OZONE GENERATING AND CONTACTING SYSTEM,
Grace, W. R. and Co., New York. (assignee).
For primary bibliographic entry see Field 5D.
W75-04461

METHOD AND APPARATUS FOR PRODUCING A DISTILLATE,
Fried-Krupp G.m.b.H., Essen (West Germany). (assignee)
For primary bibliographic entry see Field 3A.

W75-04465

DESIGN AND APPLICATION OF A MULTIPURPOSE MANAGEMENT INFORMATION SYSTEM FOR DRINKING WATER QUALITY ASSESSMENT IN DISTRIBUTION SYSTEMS,
Drexel Univ., Philadelphia, Pa.
For primary bibliographic entry see Field 5G.
W75-04505

COMPUTER CONTROL OF CHEMICAL ADDITION AT A WATER-TREATMENT PLANT,
Autocon Industries, St. Paul, Minn.
A. W. Manning.
Journal of the American Water Works Association, Vol 65, No 7, p 498-503, July 1973. 12 fig.

Descriptors: *Water treatment, *Automation, *Control, Digital computers, *Chemicals, Flow rates, Statistical methods, Algorithms, Regression analysis, Computer models, Iowa, Rivers, *Water quality control, Turbidity, Water temperature, Costs, Alkalinity, Variability, Mathematical models, Systems analysis, *Treatment facilities.
Identifiers: Sensors, Chemical feed, Water intake, Historical data, Raw water, Volumetric feeder.

In today's semiautomated water treatment plants, chemical feed is based primarily on one variable-flow rate. This method usually proves inaccurate and wasteful of expensive chemicals. The more desirable solution to this problem is complete automation of the dose rate based upon accurate information provided by on-line sensors that measure varying chemical constituents of water. A computer controlled system developed for such a facility at an Iowa City water treatment plant is described. The lack of adequate sensors has up to now delayed the use of computers for process control in water treatment. Iowa City has chosen a medium-scale digital computer which, through input-output multiplexing, automatically processes sensor inputs of varying water quality at the central processor unit. The Iowa City treatment system, which consists of two separate plants and a third under construction to contain the computerized control system, is described. Pertinent chemicals, sensors and control concepts are considered. A mathematical modeling approach based on multiple linear regression analysis of all available data is described. This method, combined with a manual input approach, offers the most flexibility. (Bell-Cornell)
W75-04535

A BILL TO ASSURE SAFE DRINKING WATER.
For primary bibliographic entry see Field 6E.
W75-04652

ASBESTIFORM AMPHIBOLE MINERALS: DETECTION AND MEASUREMENT OF HIGH CONCENTRATIONS IN MUNICIPAL WATER SUPPLIES,
Duluth, Minn. National Water Quality Lab.
For primary bibliographic entry see Field 5A.
W75-04818

TURBIDITY REMOVAL USING POLYMERS AND ACTIVATED CARBON,
Purdue Univ., Lafayette, Ind.
R. D. Miller.
PhD Thesis, 1973, 163 p.

Descriptors: Turbidity, *Polymers, *Coagulation, *Adsorption, *Activated carbon, Waste water treatment, *Water treatment.
Identifiers: *Turbidity removal, Coagulation-adsorption processes.

A possible coagulation-adsorption process for turbidity removal has been investigated. For clay destabilization using only polycations, optimum clarity was achieved over a narrow range of polymer dosages. Residual polymer concentrations below one mg/liter were determined for polycations using clay coagulation tests and for polyanions and nonionic polymers using a filtering technique. Combined use of carbon and polycations for clay removal was inferior to the use of polycations alone. Use of carbon and polyanions or nonionic polymers for clay removal produced some clarity at relatively low carbon dosages and nearly complete clarity at carbon dosages of 5.0 g/liter or higher with a mixing time of thirty minutes and settling time of ten minutes. (Sandoski-FIRL)
W75-04820

VIROLOGICAL STUDIES IN WATER SYSTEMS: NATURAL OCCURRENCE OF REOVIRUSES AND THEIR INACTIVATION BY PHYSICAL AND CHEMICAL AGENTS,
Iowa Univ., Iowa City.
S. C. Mehta.
PhD Thesis, 1973, 105 p.

Descriptors: *On-site investigations, *Viruses, Water samples, Evaluation, *Iowa, *Water treatment, Waste water treatment, Pollutant identification.
Identifiers: *Reoviruses, Viral resistance, Coralville Reservoir(Iowa), Iowa River(Iowa), Cedar River(Iowa).

Field investigations of two water systems were undertaken to evaluate the detection of reoviruses in water samples collected from the Coralville Reservoir, Iowa River, and the Cedar River. A two-phase separation method was used to concentrate the viruses from the water samples. L cells and KB cells were used to propagate the virus. Immunofluosrescent staining was employed to identify the viruses. Reovirus was resistant to heat, less resistant to ultraviolet, and least resistant to chlorine and ozone. A comparison of resistance to inactivation between reoviruses and polio and coxsackie viruses exposed to various physical and chemical agents also is presented. (Sandoski-FIRL)
W75-04821

SEWAGE TREATMENT IN THE POTTERIES,
Taylor (John) and Sons (England).
For primary bibliographic entry see Field 5D.
W75-04823

COAGULATION-FILTRATION PRACTICE AS RELATED TO RESEARCH.
American Water Works Association, New York. Committee on Research.
For primary bibliographic entry see Field 5D.
W75-04825

UNIVERSAL DESIGN OF A 2.5 MGD UNIVERSAL DESALTING PLANT, REVISED: VOLUME 1.
Burns and Roe, Inc., Oradell, N.J.
For primary bibliographic entry see Field 3A.
W75-04850

5G. Water Quality Control

CONTROL STRATEGY DEVELOPMENT STUDY, SAN FRANCISCO WASTEWATER MASTER PLAN,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-04352

WATER: CANADIAN NEEDS AND RESOURCES,
For primary bibliographic entry see Field 6B.
W75-04359

THE BRANDYWINE: FIVE YEARS AFTER,
Pennsylvania Univ., Philadelphia. Inst. for Environmental Studies.
For primary bibliographic entry see Field 6B.
W75-04360

DELAWARE RIVER BASIN COMPACT: A REVIEW WITH RESPECT TO ENVIRONMENTAL QUALITY,
Pennsylvania Univ., Philadelphia. Inst. for Environmental Studies.
For primary bibliographic entry see Field 6E.
W75-04361

REGULATION OF URBAN DEVELOPMENT TO CONTROL RUNOFF AND EROSION,
Pennsylvania Univ., Philadelphia. Inst. for Environmental Studies.
For primary bibliographic entry see Field 4D.
W75-04362

THE EFFECT OF LARGE APPLICATIONS OF MANURE ON MOVEMENT OF NITRATE AND CARBON IN AN IRRIGATED DESERT SOIL,
Agricultural Research Service, Brawley, Calif. Imperial Valley Conservation Research Center.
B. D. Meek, A. J. MacKenzie, T. J. Donovan, and W. F. Spencer.
Journal of Environmental Quality, Vol 3, No 3, p 253-258, July-September, 1974. 3 tab, 9 fig, 8 refs.

Descriptors: *Nitrates, *Irrigated land, *Soil profile, *Groundwater, *Water pollution, *Leaching, *Denitrification, Feed lots, Deserts, Irrigation, Carbon, Manganese, Soils, Infiltration, Soil water.
Identifiers: Manure, Irrigation schedule.

As a practical solution for disposing of large quantities of manure from feedlots, the manure is being applied at high rates on agricultural lands as an inexpensive means of disposal. In areas where there is sufficient water for leaching there is a high potential for large amounts of nitrate to reach the groundwater of the area. Results indicate that it is possible to adjust manure application rates and irrigation schedules for fine textured desert soils so that very little nitrate will be leached below the root zone. To accomplish this and achieve good crop production it is necessary to adjust the two factors to insure that the surface soil is aerobic while a reducing zone is maintained in the subsoil. Movement of soluble organic carbon into the lower soil profile is an important factor in devloping reducing zones. Manganese in the soil solution is a useful parameter for defining zones where denitrification may occur in this soil type. (Mastic-Arizona)
W75-04370

THE USE OF CHIRONOMID PUPAL EXUVIAE FOR CHARACTERIZING STREAMS,
Bristol Univ. (England). Dept. of Zoology.
For primary bibliographic entry see Field 5B.
W75-04371

STUDIES ON THE EFFECTIVENESS OF THE GUPPY POECILIA RETICULATA IN CONTROLLING CULEX PIPIENS S.L.:I. LABORATORY EXPERIMENTS ON PREDATION BEHAVIOR, (IN JAPANESE),
Tokyo Univ. (Japan). Dept. of Parasitology.
T. Kurihara.
Jap J Sanit Zool. Vol 24, No 1, p 73-77. 1973 Illus.
Identifiers: Fish behavior, Culex-pipiens, Food, Guppy, Laboratory, *Poecilia-reticulata, *Predation, *Mosquito larvae, Water pollution control, Fish foods.

The guppy P. reticulata is an effective predator of mosquito larvae. Predation efficiency was studied under laboratory conditions. Observations were made on the predatory activity of guppies on

pupae are larvae. These studies were carried out to develop more effective utilization of the guppy for C. pipiens control. Two guppies were placed in each aquarium containing 2 l of water and maintained at constant laboratory temperature of 26C and 600 lx illumination. Known numbers of larvae were introduced into each aquarium at 10:00 am every morning. The number of larvae eaten within a 2-h period increased when the prey population increased from 50-100. However, the number of larvae eaten was more or less constant when the prey was more than 100. Similar results were obtained when 0.7 g of powdered laboratory animal food was introduced into each container along with the mosquito larvae. The number of larvae eaten by the guppies under condition of high larval population plus the powdered food did not show any significant difference as compared with the number of larvae consumed at high larval density and without the powdered laboratory food. When the guppy population was increased and the larvae supplied were at the ratio of 50 larvae/guppy, there were more larvae consumed/guppy under high guppy population than under lower guppy population. Guppy attack mosquito pupae actively when the guppy population is high. Many pupae were killed during a 24-h period when both guppies and pupae were in contact in a container, although any external injury was not found on pupal skin.--Copyright 1974, Biological Abstracts, Inc.
W75-04382

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED CLINTON POWER STATION UNITS 1 AND 2, ILLINOIS POWER COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
Report No. Dockets 50461-93 and 50462-91, October 1974. 309 p, 48 fig, 44 tab, 178 ref, 7 append.

Descriptors: *Salt Creek, *Nuclear powerplants, *Effluents, Environment, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, Lake, *Illinois.
Identifiers: *Environmental impact statements, *Boiling water reactors.

The proposed Clinton Power Station, Units 1 and 2 will be located in DeWitt County, Illinois, and will employ two identical boiling water reactors cooled by a once-through flow of water from a lake and Salt Creek. It is concluded to issue construction permits for the facilities subject to the following conditions: (1) avoid unnecessary environmental impacts during construction; (2) limit discharge water to 96 F, (3) define land use plan for recreation and conservation at the site; (4) do preoperational monitoring as specified; (5) provide a periodic review of construction activities for conformity as specified; (6) provide written notification of construction activities which may result in adverse impacts; and (7) provide a plan of action to eliminate harmful effects or damage. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. (Houser-ORNL)
W75-04395

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF RIVER BEND NUCLEAR POWER STATION, UNITS 1 AND 2, GULF STATES UTILITIES COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
Report No. Dockets 50458-70 and 50459-67, Sept. 1974. 204 p, 30 fig, 53 tab, 99 ref, 5 append, 1 biblio.

Descriptors: *Mississippi River, *Nuclear powerplants, *Effluents, Environment, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *Louisiana.
Identifiers: *Environmental impact statements, *Boiling-water reactors.

The proposed River Bend Station, Units 1 and 2 will be located on the Mississippi River in Louisiana and will employ two identical boiling-water reactors. The exhaust steam will be cooled by mechanical cooling towers using make-up water obtained from and discharged to the Mississippi River. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. It is concluded to issue construction permits for the facility subject to the following conditions: (1) perform certain delineated work to avoid adverse environmental impacts during construction; (2) install gaseous waste treatment equipment to meet stipulated guidelines; (3) perform preoperational monitoring as specified; (4) provide a periodic review of construction activities as set forth in the construction permit; (5) notify director of licensing of any unexpected adverse effects and suggest a plan of action to eliminate such impacts. (Houser-ORNL)
W75-04396

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED PILGRIM NUCLEAR POWER STATION UNIT 2 BOSTON EDISON COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
Report No. Docket 50471-65, Sept. 1974. 314 p, 29 fig, 38 tab, 123 ref, 3 append.

Descriptors: *Nuclear powerplants, Effluents, Environment, Administrative agencies, *Comprehensive planning, *Sites, Geology, Investigations, Hydrology, Seismology, Climatology, Meteorology, Ecology, Radioactive wastes, Water pollution, Water pollution sources, Radioactive effects, Monitoring, Public health, Transportation, Beneficial use, Cost-benefit analysis, *Massachusetts.
Identifiers: *Pressurized water reactors, *Cape Cod Bay(Mass), *Environmental impact statements.

The proposed Pilgrim Nuclear Power Station, Unit 2 is located in Massachusetts near the town of Plymouth and will employ a pressurized water reactor cooled by water from and discharged to Cape Cod Bay. The conclusion is to issue a construction permit subject to the following conditions: (1) avoid unnecessary impacts during construction; (2) perform preoperational monitoring as specified; (3) perform periodic reviews of construction activities for conformity to conditions in the permit; (4) provide written notification of unexpected adverse impacts and provide a plan of action to eliminate/reduce the harmful effects or damage. Environmental impacts are assessed and after consideration of alternatives an environmental benefit-cost summary was compiled. Environmental factors considered include climate, hydrology (surface water and ground water), ecology including aquatic life, cooling-water supply and discharge, cooling towers, cooling lakes, spray ponds, radioactive chemical and sanitary wastes, amount of dissolved oxygen and toxic chemicals in effluent water. (Houser-ORNL)
W75-04397

EFFECTIVENESS OF TWO NITRIFICATION INHIBITORS FOR ANHYDROUS AMMONIA UNDER IRRIGATED AND DRYLAND CONDITIONS,
Agricultural Research Service, Pullman, Wash.
V. L. Cochran, R. I. Papendick, and W. M. Woody.
Agron J. Vol 65, No 4, p 649-653. 1973, Illus.
Identifiers: *Ammonia(Anhydrous), Azide, Chloro-6-Trichloromethyl, *Dryland conditions, Inhibitors, *Irrigated land, Leaching, *Nitrification, Nitrogen, Potassium, Pyridine, Retention, Triticum-Aestivum, Zones, *Washington, Absorption.

Potassium azide (KN3) and 2-chloro-6-(trichloromethyl) pyridine (N-Serve) were evaluated as nitrification inhibitors for anhydrous NH3 field applied on irrigated and nonirrigated Ritzville silt loam and on nonirrigated Naff silt loam in eastern Washington. Formulations of KN3, N-Serve in liquid NH3, or Nh3 alone were applied to follow soil in midsummer at a rate of 90 kg N/ha. Irrigations were 15 cm of water sprinkler applied 1 day or 2 wk after fertilizer application, and 10-15 cm of water each time at 4,8 and 13 wk after NH3 application. The NH3 retention zone was sampled for NH+4 and NO-3 periodically through Dec. for the Naff soil and through Feb. for the Ritzville soil. Both KN3 and N-Serve effectively inhibited nitrification of the applied NH3 on nonirrigated Ritzville soil when temperature and soil moisture were favorable for rapid nitrification. However, KN3 was completely ineffective following irrigation or, for the Naff soil, after rainwater penetrated below the retention zone 2 wk after N application. Where irrigated 1 day or 2 wk after fertillization application, all of the applied N had disappeared from the initial NH3 retention zone in the Ritzville soil in 8-13 wk for both NH3 alone and NH3 + KN3. Results with the Naff soil for these applications were similar to results with the irrigated Ritzville soil. By contrast, N-Serve effectively suppressed nitrification under leaching and nonleaching conditions. For the Ritzville soil, total N uptake by the wheat (Triticum aestivum L.) crop for different rates of fertilizer application followed the order of NH3 + KN3 greater than NH3 + N-Serve greater than NH3 alone, but grain yields with NH3 + inhibitor were not different from yields with NH3 alone. For the Naff soil there was no N-uptake or grain-yield response to N rates, and thus no response to the inhibitors.--Copyright 1974, Biological Abstracts, Inc.
W75-04425

UTILIZATION OF THE EARTH'S NATURAL HEATING SYSTEM TO DESALT GEOTHERMAL BRINES FOR AUGMENTATION OF THE COLORADO RIVER SYSTEM,
Bureau of Reclamation, Boulder City, Nev. Region 3.
For primary bibliographic entry see Field 3A.
W75-04430

COMPLYING WITH DISCHARGE REGULATIONS,
Environmental Protection Agency, Washington, D. C.
C. J. Schafer, and N. Lailas.
Environmental Science and Technology, Vol 8, No 10, p 903-906, October 1974. 1 fig, 2 tab.

Descriptors: *Discharge(water), *Federal Water Pollution Control Act, *Effluents, *Legislation, Planning, Analysis, Monitoring, *Water permits, *Water pollution control.

Under the new national permit system for pollutant discharge, the National Pollutant Discharge

Elimination System, all industries and municipalities must limit their point source effluent discharges into navigable waters. The permit to be issued has a compliance schedule and monitoring requirements. Target dates are July, 1977 for 'best practicable control technology currently available', and July, 1983 for 'best available treatment economically achievable', as part of the Federal Water Pollution Control Act Amendments (PL 92-500). The legislation gives Environmental Protection Agency administrators the responsibility of publishing regulations with guidelines for effluent limitations. Compliance schedules contain dates for the preparation of engineering reports, planning and completion of construction, and the operation of wastewater treatment facilities. Permits will be issued for fixed terms, the maximum duration being five years. The permits must specify self-monitoring requirements for a facility including sample type, frequency of analysis, and frequency of reporting to the regulatory agency. Discharges will be reported by each municipality of industrial facility on a 'Monitoring Discharge Form', recording minimum, average, and maximum values in terms of quantity and concentration, representing a 24-hour day, as obtained from the analysis performed. It will be the responsibility of the permittee to notify the EPA regional administrator if he cannot comply with effluent limitations at any time. (Prague-FIRL)
W75-04431

ASCE URBAN WATER RESOURCES RESEARCH PROGRAM, 1967-1974,
American Society of Civil Engineers, New York.
For primary bibliographic entry see Field 4A.
W75-04440

METHODS FOR ELIMINATION OF OIL SLICKS,
Grace W. R. and Co., New York, (assignee).
R. W. McKinney, A. L. Dixon, Jr., and R. L. Jordan.
U.S. Patent No 3,843,517, 5 p, 6 tab, 9 ref; Official Gazette of the United Stated Patent Office, Vol 927, No 4, p 1636, October 22, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Water pollution control, *Water quality control, *Pollution abatement, Freeze drying, Microorganisms, Nutrients.

Substances and methods are described for removing oils and other hydrocarbons from surfaces such as shorelines and those of fresh and salt water, whether contained or essentially open. The substances comprise freeze-drying, (1) microorganisms along with nutrients, or (2) microorganisms within a carrier material, or (3) microorganisms within a carrier also containing nutrients. Alternatively, freeze-dried microorganisms may be admixed with a carrier material which may or may not contain nutrients. For removal of a hydrocarbon or oil, any of these compositions, or a mixture, is placed on the hydrocarbon or oil deposit to be removed. The oil or hydrocarbon is then digested by the microorganisms. The carrier adsorbs and concentrates the oil in the presence of the microorganisms and the microorganisms consume the oil. The microorganisms remain viable in these compositions even after long storage periods. In an alternative composition, the microorganisms may be freeze-dried and then admixed with a carrier such as clays, vermiculites, perlites, silica gels or so on. (Sinha-OEIS)
W75-04455

DIRECTORY OF ENVIRONMENTAL LIFE SCIENTISTS,
Institute of Ecology, Madison, Wis.
For primary bibliographic entry see Field 6G.
W75-04468

CHEMICALS AND ALLIED PRODUCTS, (LITERATURE REVIEW),
Union Carbide Corp., South Charleston, W. Va.
D. C. Macauley.
Journal of the Water Pollution Control Federation, Vol 46, No 6, p 1337-1341, June, 1974. 36 ref.

Descriptors: *Chemicals, *Nitrogen, *Water pollution sources, Plastics, Adsorption, Waste water treatment, Biological treatment, Recycling, Federal Water Pollution Act, *Reviews, *Bibliographies.
Identifiers: *In-unit control, Synthetic resins, Nitrogenous fertilizer.

The organic chemical industry along with the synthetic resins segment of the plastics and synthetics industry, has set up guidelines for the implementation of the 1972 Federal Water Pollution Control Act. The degree to which water can be made pollution-free by the best technology available which is economically feasible was determined. Water pollution in the nitrogen industry, including nitrogenous chemicals used for chemical processing and nitrogenous fertilizer, was examined. (Leibowitz-FIRL)
W75-04474

DESIGN AND APPLICATION OF A MULTIPURPOSE MANAGEMENT INFORMATION SYSTEM FOR DRINKING WATER QUALITY ASSESSMENT IN DISTRIBUTION SYSTEMS,
Drexel Univ., Philadelphia, Pa.
S. Kovacs.
Available from Xerox University Microfilms, Ann Arbor, Mich, 48106, Order No. 74-20,716. Ph.D. Thesis, 1974. 314 p.

Descriptors: *Computer models, *Water quality control, *Domestic water, *Water management(Applied), Public health, Operations, Management, Mathematical models, Water supply, *Design, Potable water, *Water distribution(Applied).
Identifiers: Multipurpose management information system(MMIS).

A computer based multipurpose management information system, MMIS, for drinking water quality data has been designed. The City of Philadelphia, Pennsylvania was used as a prototype model. Degradation of water quality can be a public health hazard and cause aesthetic problems of discoloration, taste, and odor. An MMIS is necessary to provide correct and available information on water quality indicators in distribution systems. The MMIS can be utilized in the research of cause and effect relationships of water quality deterioration and also for managerial and operational decision-making. Statistical techniques which are appropriate for the study of water quality deterioration and for the empirical definition of water quality are presented. The MMIS can be adapted by a municipal water utility to meet its specific information requirements. The MMIS can also be used as a modular subsystem of an overall water utility management information system. (Orr-FIRL)
W75-04505

A BALANCED APPROACH TO RESOURCE EXTRACTION AND CREATIVE LAND DEVELOPMENT ASSOCIATED WITH OPEN-PIT COPPER MINING IN SOUTHERN ARIZONA,
F. S. Matter, K. N. Clark, J. A. Hann, S. P. Schuman, and B. J. Blanchard.
University of Arizona, Tucson College of Architecture and the College of Mines, 1974. 85 p. Drawings (w/overlays), photographs, maps, 6 ref.

Descriptors: *Mine wastes, *Comprehensive planning, *Environmental effects, *Land use, *Model studies, *Landscaping, *Terracing, Mining, Waste disposal, Water pollution sources, Water demand, Multiple-purpose projects, Area development, Cost-benefit analysis, Arizona, Alternative planning, Aesthetics.

The problem areas associated with the 6 open-pit copper mining operations in a 21-mile stretch along the Sierita foothills on the western side of the Santa Cruz Fiver Valley, Pima County, Southern Arizona were disposal of overburden, trailing ponds and water demand, all characteristics of environmental problems generally associated with this method of extraction. In the proposed solutions, an attempt has been made to balance possible new uses for areas now considered environmental liabilities with the operational constraints that created them. Factors taken into account in considering tradeoffs are the presence of agricultural activities, ranching, residential settlements, Papago Indian reservation, state-owned land, proximity to Tucson, dependent on the river basin affected for one-third of its groundwater needs. Ideas presented are conceptual models designed to illustrate possible land use patterns, both short-term implications for two sites, and long-term implications as built into a comprehensive plan for the Santa Cruz Valley. Some of these ideas project new methods for waste and tailings disposal, use of terraces to create mines-residential interfaces through man-made landscapes, increased efficiency in water recycling. The schematic description of satellite city developments includes attention to economic, environmental, and aesthetic considerations. (Paylore-Arizona)
W75-04510

A SYSTEMS ANALYSIS OF WATER QUALITY SURVEY DESIGN,
Clemson Univ., S. C.
For primary bibliographic entry see Field 5B.
W75-04522

AN ECONOMIC ANALYSIS OF AGRICULTURAL LAND USE PRACTICES TO CONTROL WATER QUALITY,
Cornell Univ., Ithaca, N. Y.
J. J. Jacobs, and J. F. Timmons.
American Journal of Agricultural Economics, Vol 56, No 4, p 791-798, November 1974. 2 tab, 10 ref.

Descriptors: *Water quality control, Agriculture, *Land use, *Phosphorus, *Sediment, *Linear programming, *Cost-benefit analysis, Estimating, Streams, Constraints, Crops, River basins, Methodology, Surface waters, Watersheds(Basins), Abatement, Costs, Mathematical Models, Computers, Systems analysis.
Identifiers: *Economic analysis, Cost minimization, Distribution of costs.

Sediment and phosphorus losses to streams from crop and pasture land can be reduced through production practices. Costs (measured in terms of reductions in farm income) of changes in agricultural practices necessary to achieve various levels of soil and phosphorus in surface water leaving a watershed are analyzed. The data requirement for selecting and analyzing alternative levels of water quality is outlined, the least-cost means of achieving particular quality levels via agricultural production practices is estimated, and the benefits needed to offset costs of achieving a particular level of water quality are determined. A combination of cost minimization and incremental cost-benefit analysis is used. A linear programming model is formulated to estimate the cost of reducing soil and phosphorus entering the stream from agricultural lands. Then an attempt is made to estimate the benefit of reduced soil losses to a municipal water supply and to recreational uses. The framework is applied to the Nishnabotna River Basin in southwestern Iowa. Results show that the associated abatement costs to farmers are substantial and increase rapidly as the sediment and phosphorus constraints become more stringent. Distribution of these costs is determined by the type of regulation established. (Bell-Cornell)
W75-04526

ENVIRONMENTAL VALUES AND WATER QUALITY PLANNING,
California Univ., Davis. Div. of Environmental Studies.
P. Richerson, and R. Johnston.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY2, Proceedings paper No 11136, p 259-276, February 1975. 2 fig, 59 ref.

Descriptors: *Human resources, Hydraulics, *Project feasibility, *Water quality, Natural resources, *Recreation, Value, Mathematical models, *Planning, Esthetics.
Identifiers: *Environmental quality, Economic analysis, Government agencies, Uncertainty principle.

Two fundamental types of problems affect the incorporation of wilderness, scenic, and recreation values into water quality planning: (1) problems of incommensurable values; and (2) problems of incomplete information. The nature of these problems is reviewed in the context of rational planning models. Criticized is the rational goal-oriented benefit maximizing model of planning that ignores the problems of value and knowledge. State-of-the-art methods for coping with value and information difficulties, including NEPA, the Water Resources Council Principles and Standards, and contingency planning techniques, are described. An empirical research strategy for investigating planning behavior is proposed and preliminary results for three agencies, the United States Army Corps of Engineers, the Federal Bureau of Land Management, and the California State Water Resources Control Board, are reported. In order to incorporate environmental and recreation interests successfully into decision making, water quality planners must be prepared to actively experiment with the quasipolitical techniques that public participation implies. They must candidly evaluate the quality and comprehensiveness of their information and knowledge and be prepared to make more extensive use of flexible short-range and contingency-oriented approaches than of long-range comprehensive planning and its ideals. (Bell-Cornell)
W75-04530

COMPUTER CONTROL OF CHEMICAL ADDITION AT A WATER-TREATMENT PLANT,
Autocon Industries, St. Paul, Minn.
For primary bibliographic entry see Field 5F.
W75-04535

ECONOMIC AND ENVIRONMENTAL CONSIDERATIONS IN DAIRY MANURE MANAGEMENT SYSTEMS,
New York State Coll. of Agriculture and Life Sciences, Ithaca, N.Y. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 5D.
W75-04543

AN IN-DEPTH LOOK AT FEDERAL POLLUTION CONTROLS,
Wisconsin Univ., Madison.
R. E. Graves.
Hoard's Dairyman, Vol 119, No 9, p 614, 653, May 10, 1974. 1 fig.

Descriptors: *Regulation, *Environmental control, *Feed lots, Livestock, Poultry, Agricultural runoff, Permits, Waste treatment, Waste disposal, Federal Water Pollution Control Act, *Water pollution control, *Farm wastes.
Identifiers: Federal pollution controls, *Zero discharge.

New EPA guidelines for feedlots were published in February and were met with tremendous reaction. One reason for the strong reaction was that they seemed to include livestock under every conceivable system of management. No distinction was made based on numbers of animals, concentration of animals, or location with respect to streams or lakes. EPA considers any confined group of beef, dairy cattle, swine, sheep, horses, chickens, turkeys, or ducks a potential feedlot. The most drastic change found in the guidelines and standards recently issued was the exclusion of smaller livestock farms. Exclusion from these regulations does not mean that smaller livestock farms can forget about pollution control. Any person or firm is still responsible for water pollution resulting from its actions or inactions. The most outstanding conclusion and recommendation of this report deals with 'zero discharge'. Without establishing a meaningful definition of zero discharge or even feedlot pollution, it was concluded that practicable available technology is available to achieve zero discharge from all feedlots by July 1, 1977. (Carmell-East Central)
W75-04544

FARMS ARE NOT IN THE COUNTRY ANY MORE,
New Jersey Agricultural Experiment Station, New Brunswick.
For primary bibliographic entry see Field 5D.
W75-04546

REDUCING FEEDLOT NITRATES IN YOUR GROUND WATER,
For primary bibliographic entry see Field 5B.
W75-04547

SIMULATION AND STATISTICAL QUALITY CONTROL FOR WATER POLLUTION ABATEMENT,
Texas A and M Univ., College Station.
D. Phantumvanit.
Available from Xerox University Micro-films, Ann Arbor, Mich, 48106, Order No. 74-21, 214. Ph D Thesis, p 172, 1974.

Descriptors: *Pollution abatement, *Water quality control, *Waste water treatment, *Management, Operation, Planning, Model studies, Theoretical analysis.

The increases in water pollution problems and in the public demands for high quality water necessitate the proper management of regional water quality systems. To assist in the management of the stochastic nature of a regional water quality system the following were developed: a model of the reliability associated with the system goals; programs describing the system management strategies; and a sensitivity analysis to provide planners with alternative solutions subjected to changes in water quality requirements. Operating characteristics curves were formulated for mjaor waste water treatment plants. These curves illustrated the relationships between the quality of treated waste effluent quality and regional water system reliability and also the impact of each waste water treatment plant on regional water quality. The overall process efficiency distributions for major waste water treatment plants were discussed and described by some standard distributions. (Orr-FIRL)
W75-04557

AN OPERATIONAL FRAMEWORK FOR COASTAL ZONE MANAGEMENT PLANNING.
Meta Systems, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 6A.
W75-04558

MANUAL FOR DEICING CHEMICALS: APPLICATION PRACTICES,
Little (Arthur D.), Inc., Cambridge, Mass.
D. L. Richardson, R. C. Terry, J. B. Metzger, and R. J. Carroll.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Environmental Protection Agency, Cincinnati, Ohio. Report EPA-670/2-74-045, p 152, December 1974. 55 fig, 8 tab, 10 ref, 1 append. 1BB034; ROAP-ATB; TASK-036, EPA Contract No 68-03-0154.

Descriptors: Sodium chloride, Calcium chlorides, Sands, Snow, Ice, Supervision, *Deicers, *Snow removal *Maintenance, Salts.
Identifiers: Deicing chemical spreaders, *Deicing chemicals, Deicing chemical usage, Snow and ice control management, Citizen participation, Winter road maintenance.

Results are presented of a study to minimize the loss to the environment of chemicals used in controlling snow and ice on highways. Based on the best current practices for highway maintenance as observed during two years of study, practical guidelines are presented for the use of deicing chemicals. (1) Supervisory aspects of proper chemical usage are defined, including organization and personnel training. (2) Efficient snow and ice control requires good judgment and appropriate action. Elements of proper decision-making are discussed, including weather forecasting, setting chemical application rates, and accounting for chemical usage. (3) The backbone of winter road maintenance is equipment. General requirements and major equipment classes are described, including recent improvements and advantages or disadvantages. Methods are given for accurate spreader calibrations. (4) Means are described for developing and enlisting the support of citizens and drivers for winter road maintenance policies. (5) Legal requirements for and constraints on snow and ice control are described. (See also W75-04568) (EPA)
W75-04567

MANUAL FOR DEICING CHEMICALS: STORAGE AND HANDLING,
Little (Arthur D.), Inc., Cambridge, Mass.
D. L. Richardson, C. P. Campbell, R. J. Carroll, D. I. Hellstrom, and J. B. Metzger.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-236 152, $4.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Cincinnati, Ohio. Report EPA-670/2-74-033, p 88, July 1974. 33 fig, 8 tab, 6 ref. 1BB034/ROAP 21ASZ/TASK AE, EPA Contract No 68-03-0154.

Descriptors: *Calcium chloride, *Deicers, *Ice, *Snow removal, *Sands, Highways, *Salts.
Identifiers: Deicing chemical storage, Deicing chemical handling, Highway deicing chemicals, Bulk storage, Bulk handling.

Results are presented of a study to minimize the loss to the environment of chemicals used in controlling snow and ice on highways. Based on the best current practices for highway maintenance as observed during two years of study, practical guidelines are presented for good practice in the storage and handling of deicing chemicals. (1) Covered storage of salt and other deicing chemicals is strongly recommended; permanent structures for this purpose are preferable. Guidelines are given for site selection and for design foundations, paved working area, and site drainage. Existing storage facilities are presented that represent a range of costs, designs, construction materials and storage capacities. (2) For the handling of salt and other deicing chemicals, general precautions and good housekeeping practices are defined. (3) Environmental responsibilities are discussed for personnel who administer and supervise highway maintenance. (See also W75-04567) (EPA)
W75-04568

ENFORCEMENT ECONOMICS IN AIR POLLUTION CONTROL,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Economics.
P. B. Downing, and W. D. Watson, Jr.

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, price $1.50. Environmental Protection Agency, Report EPA-600/5-73-014, p 104, December 1974. 17 fig, 17 tab, 15 ref, append. 1HA094.

Descriptors: Economics, *Air pollution, *Cost analysis, *Alternative costs, Monte Carlo method, Simulation analysis.
Identifiers: *Air pollution control.

The effects of alternative enforcement strategies on the pollution control activities of the generalized model of a firm are investigated. There are a number of tradeoffs available to a firm including delay and non-compliance which allow it to minimize expected pollution control costs. These are identified within the context of a generalized behavioral model for the firm and an empirical study is undertaken to determine their importance. In a simulation of current enforcement of the federal new source particulate matter discharge standard for coal-fired power plants it is found that cost-minimizing power plants will install relatively costly pollution control technology and frequently violate federal fly ash standards. Two alternative enforcement strategies for overcoming these shortcomings, namely compliance tests in combination with emission taxes and emission taxes alone, are analyzed. In the case of the federal fly ash discharge standard for coal-fired power plants it is tentatively concluded that emission tax enforcement would probably result in an approximate minimization of the sum of firm and enforcement agency resource costs. The general applicability of this result to other enforcement problems is discussed. (EPA)
W75-04569

AN EVALUATION OF MARKETABLE EFFLUENT PERMIT SYSTEMS,
Meta Systems, Inc., Cambridge, Mass.
R. J. deLucia.
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402, Price $4.15. Environmental Protection Agency report number, EPA-600/5-74-030, September 1974. 333 p, 4 fig, 14 tab, 2 append. IBA 030, ROAP 21AXN06. EPA Contract 68-01-1882.

Descriptors: *Permits, *Model studies, *Water pollution control, Water permits, Regulation, *Simulation analysis, Administration, Legal aspects, River basins, *Pollution charges(Taxes), *New York, Costs.
Identifiers: *Marketable effluent permits, *Mohawk River(NY).

The practical problems and prospects of using marketable effluent permits (MEP) as a water pollution control tool are studied. Under such a system, pollution rights are contingent upon possession of permits; the permits are acquired and/or traded through an auction or market. This study details the requirements of MEP systems, discusses their theoretical advantages, and examines them through the use of industrial organization theory, comparisons with analogous markets, and a simulation model. The simulation model employs Mohawk River data to determine the effect of different system parameters on the operation of a MEP system. The legal and administrative aspects of the marketable permit system are also dealt with. The conclusion is that marketable permits are a promising control tool for many river basins. (EPA)
W75-04571

USED OIL LAW IN THE UNITED STATES AND EUROPE,
Environmental Law Inst., Washington, D. C.
W. A. Irwin, and R. A. Liroff.
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402, Price $3.65. Environmental Protection Agency, Report EPA-600/5-74-025, July 1974. 289 p, 6 tab, 9 append. 1D1315-24ACN-04 1B1030-51AQK-03, 68-01-2203.

Descriptors: Environment, Air environment, Aquatic environment, Air pollution, Oil, Oil pollution, *Oil wastes, *Waste disposal, *Regulation, *Legal aspects, Jurisdiction, Vegetation, Water law, *Water pollution control, United States, Europe.

Existing information is reviewed on the collection and disposal of used automotive and industrial oils and on the potential health risks of improper disposal of such oils. Provisions of federal law governing disposal of used oils are analyzed. The history of federal taxation of lubricating oils is recounted, as is that of federal requirements for labeling products made from used oils. State laws regulating used oil disposal and reprocessed oil labeling are analyzed and the laws (and/or proposed laws) of several other industrialized nations governing used oil collection and disposal are described. The elements of a comprehensive program for regulating used oil collection and disposal and alternative means for implementing and funding such a program are discussed. Recent Congressional bills relating to used oils are examined. (EPA)
W75-04575

ECONOMIC DISINCENTIVES FOR POLLUTION CONTROL: LEGAL, POLITICAL, AND ADMINISTRATIVE DISINCENTIVES,
Environmental Law Inst., Washington, D. C.
W. A. Irwin, and R. A. Liroff.
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402, Price $3.35. Environmental Protection Agency, Report EPA-600/5-74-026, July 1974. 257 p, 16 append. 1D1315-24ACN-04, 1B1030-51AQK-03, 68-01-2203.

Descriptors: Environment, Air environment, Aquatic environment, Air pollution, *Legal aspects, Jurisdiction, Regulation, *Pollution charges(Taxes), *Economics, Taxes, Water pollution control, *Constitutional law, Legislation.
Identifiers: *Disincentives(Economic).

An economic disincentive is defined as a monetary charge levied by government on conduct which is not illegal but which does impose social costs, for the principal purpose of discouraging the conduct. Disincentives are distinguished from other legal mechanisms which may have incidental economic disincentive effects, e.g., fines, user charges, and license fees. The constitutionality of federal or state imposition of disincentives is examined and the authority of the U.S. Environmental Protection Agency and the States to utilize disincentives under selected federal environmental statutes is analyzed. The legality of some disincentives adopted by states is discussed. The charges imposed by several European countries are described and distinguished from disincentives. The history of some previous proposals for federal disincentives is reviewed and suggestions for additional disincentives which might be feasible are offered. (EPA)
W75-04576

AN ASSESSMENT OF WET SYSTEMS FOR RESIDENTIAL REFUSE COLLECTION: SUMMARY REPORT,
Curran Associates, Inc., Northampton, Mass.
For primary bibliographic entry see Field 5D.
W75-04577

MERCURY IN FOOD: A SCIENTIFIC STATUS SUMMARY BY THE INSTITUTE OF FOOD TECHNOLOGISTS' EXPERT PANEL ON FOOD SAFETY AND NUTRITION,
Institute of Food Technologists, Chicago, Ill. Expert Panel on Food Safety and Nutrition.
For primary bibliographic entry see Field 5C.
W75-04579

ENVIRONMENTAL LAND AND WATER MANAGEMENT ACT--AMENDMENTS,
Florida Sess. Laws, Vol 4, Ch. 74-326, p 782-784, approved June 26, 1974, effective July 1, 1974 (1974). 3 p.

Descriptors: *Land resources, *Water resources development, *Land management, *Water management (Applied), Land development, Land use, Natural resources, Water resources, Enforcement, Legislation, adoption of practices, Regional analysis, Regional development, Economic aspects, Social aspects, Regions, Comprehensive planning, *Florida.
Identifiers: State policy, *Environmental policy.

Amendments to the Florida Environmental Land and Water Management Act provide for the procedure involved in obtaining a permit for a development of regional impact (DRI). Hearings by local governments for applications on DRI's are provided only after the regional planning agency certifies that the application contains sufficient information or written notice is received that the requested information will not be supplied. Notice of such hearings shall be given sixty days in advance. A decision will be made on each application within thirty days, unless an extension is requested by the developer. The act also provides for joint public hearings on DRI's. Where two or more developments of regional impact are being jointly undertaken a joint review of applications is available. Enforcement procedures are also included. (Proctor-Florida)
W75-04581

COASTAL RESOURCES MANAGEMENT AND CONSERVATION REPORT PUBLISHED,
For primary bibliographic entry see Field 2L.
W75-04583

WATER QUALITY MANAGEMENT BASIN PLANS REGULATIONS ADOPTED,
Pollution Control Guide, Vol 3, paragraph 19738, p 19277, 1974. 1 p.

Descriptors: Basins, *River basin development, *Water quality, Groundwater basins, Watersheds(Basins), Demonstration watersheds, Water law, Regions, *Watershed management, Water resources development, Data collections, Data processing, *Regulation, Law enforcement, Administrative agencies, Administrative decisions, Inter-agency cooperation, Water quality control, Planning, Water management(Applied).
Identifiers: *Administrative regulations, *Environmental policy.

Requirements for preparation of water quality management basin plans and the procedures governing basin plan adoption, submission, revision, and Environmental Protection Agency approval are described. Basin plans must be coordinated with any discharge permits for sources located in the planning area. The basin plans are to be generally designed to accommodate water quality management both in areas having complex water quality problems and in less complicated situations. Written comments on the proposed regulations were received from interested parties and incorporated into the regulations where appropriate. As a result, the requirement that basin plans be coordinated with water quality standards implementation plans has been deleted. Each basin plan must be revised within five years of the last approval date. Specific considerations in the revision process are listed. An effective date is provided. (Sperling-Florida)
W75-04584

EPA EFFORTS TO END FEEDLOT MANURE POLLUTION CRITICIZED,
Pollution Control Guide, Vol 3, paragraph 19784, p 19371-19374, 1974. 4 p.

Descriptors: *Feedlots, *Management, *Farm wastes, *Farm management, Economics, Cattle, Livestock, Fertilizers, Waste disposal, Water quality, Water law, Water policy, Water quality control, Water quality standards, Resources development, Pollution abatement, Water pollution control, Alternative planning, Administration, Administrative decisions, Federal government.
Identifiers: *Administrative regulations, Congressional hearings, Environmental policy.

The House Committee on Government Operations criticized the Environmental Protection Agency and the Department of Agriculture for inadequate efforts to control feedlot manure pollution and for failing to encourage use of manure for fertilizer. Today, food animals and some racehorses are raised in small, concentrated areas, called feedlots, some of which are within metropolitan areas. About 2 billion tons of animal wastes are produced annually in the United States. When used properly in agriculture, animal wastes are a valuable resource. When such wastes, however, are discharged into a navigable waterway, they often cause severe oxygen depletion for miles downstream which results in fish kills. The Refuse Act of 1899 has been used to require all feedlot owners and operators to obtain permits before discharging the manure into navigable waterways. This attempts to control the pollution at its source. The increasing shortage of chemical fertilizers is causing a renewed interest by farmers in animal wastes as a fertilizer. The Bureau of Mines has also initiated research into the conversion of organic wastes, including animal manure, into fuels. (Sperling-Florida)
W75-04585

EPA TO ISSUE IMPACT STATEMENTS ON SOME REGULATORY ACTIONS,
Pollution Control Guide, Vol 3, paragraph 19760, p 19307-19308, 1974. 2 p.

Descriptors: *Environmental Effects, *Water resources development, *Administrative decisions, Water quality, Legislation, Jurisdiction, Government, Regulation, Permits, Administration, Federal government, Water quality control, Pollution abatement, Water pollution control, Air pollution.
Identifiers: *Environmental impact statement, *National Environmental Policy Act, *Administrative regulations, Environmental policy.

The National Environmental Policy Act of 1969 requires that federal agencies prepare detailed environmental statements on proposals for legislation and other federal actions significantly affecting the quality of the human environment. The objectives of NEPA are to compel an agency's decision-making process to include an appropriate and careful consideration of all environmental aspects of proposed actions. The Federal Courts of Appeals have held that federal agencies need not prepare environmental impact statements for environmentally protective activities. In recognition of statutory and court-ordered deadlines, and the need for prompt pollution abatement, impact statements must be prepared in connection with all ocean dumping site designations. The Environmental Protection Agency, while not required to file an impact statement for its actions, is presently informing the public of the environmental effects of its major regulatory actions. (Sperling-Florida)
W75-04586

PERMIT PROVISIONS ADOPTED FOR OCEAN WATER ACTIVITY,
Pollution Control Guide, Vol 3, paragraph 19810, p 19432-19436, 1974. 5 p.

Descriptors: *Oceans, *Navigable waters, *Regulation, *Dredging, Construction, Water pollution, Water pollution sources, Bodies of water, Water resources development, Water quality, Federal Water Pollution Control Act, Rivers and Harbors Act, Legislation, Judicial decisions, Jurisdiction, Permits, Waste disposal, Disposal, Administrative agencies, Federal government.
Identifiers: *Administrative regulations, Environmental policy, Fill permits, National Environmental Policy Act, FWPCA Amendments of 1972.

Proposed regulations prescribe the policy, practice and procedure to be followed by all Army Corps of Engineers installations and activities in connection with applications for permits authorizing structures and work affecting navigable waters. The regulations are set forth pursuant to the Rivers and Harbors Act of 1899, the Federal Water Pollution Control Act and the Marine Protection, Research and Sanctuaries Act. Provisions related to the discharge of dredged or fill material into navigable waters and the transportation of dredged material for the purpose of dumping it into ocean waters. The Department of the Army publishes the final regulations which prescribe the policies, practice and procedures to be followed in processing Army permits. The regulations have been revised and compiled based on comments received from the general public, other federal agencies, and Corps field offices as well as interpretive guidance received from recent judicial decisions. The analysis of the provisions summarizes comments of particular significance and discusses the basis for the decisions which were made. (Sperling-Florida)
W75-04587

ZAHN, ET AL. V. INTERNATIONAL PAPER CO. (CLASS ACTION SEEKING DAMAGES FROM DISCHARGES),
For primary bibliographic entry see Field 6E.
W75-04588

PROPOSED 1973 OUTER CONTINENTAL SHELF OIL AND GAS GENERAL LEASE SALE OFFSHORE MISSISSIPPI, ALABAMA, AND FLORIDA, VOLUME 4, (FINAL ENVIRONMENTAL STATEMENT),
Bureau of Land Management, Washington, D. C.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va. 22161, as EIS-MS-73-1651-F-4, $10.60 paper copy, $2.25 microfiche. October 17, 1973. 335 p, 2 map, 6 graph, 6 tab.

Descriptors: *Environmental effects, *Leases, *Oil wells, *Continental shelf, *Gulf of Mexico, Offshore platforms, Gulf coastal plain, Mississippi, Alabama, Florida, Federal government, Federal jurisdiction, Mineral industry, Administrative agencies, Oil pollution, Oil industry, Exploitation, Exploration, Oil, Administration, Contracts, Water law, Legal aspects, Oil spills, Oil fields.
Identifiers: *Environmental impact statements, Offshore mineral leases, Territorial seas(Jurisdiction), Liability(Legal aspects), Energy crisis.

This volume is one of five volumes which comprise the Final Environmental Statement for the Outer Continental Shelf (OCS). This section presents an account of the consultation and coordination processes involved in the preparation of the draft and final statements. All federal and state agency review comments are included, and where appropriate, the disposition of pertinent comments leading to preparation of the final statement are indicated. Also included are public hearing testimony and records, and written comments from private organizations. The major areas of concern expressed by the public were: the veracity of the 'energy crisis'; compatibility of offshore mineral operations with defense activities; the degree of state participation in OCS operations; liability in the event of pollution incidents; the adequacy of operating regulations and enforcement procedures; the need for consideration of alternatives to the proposed action unique to Florida; the need for preparation of cost benefit analyses; and the need for a public referendum concerning whether or not to proceed with the proposal. (See also W75-04590) (Deckert-Florida)
W75-04589

PROPOSED 1973 OUTER CONTINENTAL SHELF OIL AND GAS GENERAL LEASE SALE, OFFSHORE MISSISSIPPI, ALABAMA, AND FLORIDA, VOLUME 5, (FINAL ENVIRONMENTAL STATEMENT),
Bureau of Land Management, Washington, D. C.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va. 22161, as EIS-MS-73-1651-F-5, $8.50 paper copy, $2.25 microfiche. October 17, 1973. 262 p, 22 tab, 4 diagram, 12 graph, 6 map.

Descriptors: *Environmental effects, *Continental shelf, *Gulf of Mexico, *Oil, *Leases, Coasts, Federal government, Legal aspects, Exploitation, Exploration, Oceans, Oil industry, Offshore platforms, Oil wells, Resources development, Resources, Administration, Adoption of practices.
Identifiers: *Environmental impact statements, Offshore oil leases, Public trust doctrine, Administrative regulations.

Volume five of five volumes comprising the Final Environmental Statement for this proposal contains the following attachments to the statement: (A) outer continental shelf operating orders number 1 through 12, Gulf of Mexico; (B) proposed schedule--provisional outer continental shelf leasing; (C) description of blocks by water depth, distance from shore, acreage; (D) report of the work group on outer continental shelf safety and pollution control, U.S. geological survey; (E) geological time chart and cross sections through the sale area; (F) windroses portraying monthly wind patterns over the Gulf of Mexico; (G) common names and scientific names for marine benthic animals; (H) population, employment, personal income, and earnings by industry, historical and projected; (I) (Department of Defense) fact sheet summarizing potential impact of possible leasing; (J) matrix appendix; (K) geological survey, outer continental shelf oil and gas operations lease and management program; (L) equipment available for emergency oil spill control and cleanup in the Gulf of Mexico; (M) sample outer continental shelf lease form; (N) list of persons who submitted oral and/or written testimony for public hearing record; Plat--depiction of blocks proposed for leasing. (See also W75-04589) (Deckert-Florida)
W75-04590

MONTGOMERY ENVIRONMENTAL COALITION, ET AL. V. FRI, ET AL. (SEEKING DECLARATORY RELIEF FROM FURTHER SEWER HOOKUPS ON POTOMAC).
1 Pollution Control Guide (Vol. 3), paragraph 15017, p 15167-15171, 1973, 5 p.

Descriptors: *Judicial decisions, *District of Columbia, *Federal jurisdiction, *Federal Water Pollution Control Act, *Law enforcement, Water Quality Act, Jurisdiction, Discharge(Water), Water pollution, Water pollution control, Water quality control, Non-structural alternatives, Local governments, State governments, Federal government, Legal aspects, Legal review, Water law, Administration, Governmental interrelations, Legislation, Permits, Adjudication procedure, Adoption of practices, Water quality standards, Water pollution effects.
Identifiers: *FWPCA Amendments of 1972, Standing(Legal), Effluent limitations, Declaratory judgements, Injunctive relief.

Two community groups and the District of Columbia brought suit against eight named government officials and agencies pursuant to the 'Citizen Suits' provision of the Federal Water Pollution Control Act Amendments of 1972. The plaintiffs sought declaratory and injunctive relief ordering the defendants to refrain from approving, authorizing, or permitting further sewer hookup permits which would result in sewage discharges affecting the water quality of the Potomac River. Seven of the eight defendants filed motions to dismiss against the two community groups. The defendants argued that the plaintiff community groups lacked standing to sue and jurisdiction, and that the plaintiff community groups failed to state a claim upon which relief may be granted. The United States District Court ruled that the plaintiff community groups had standing under the provisions of the 1972 Act, and that alleged violations of effluent standards established under the 1965 Water Quality Act satisfied the jurisdictional requirements of the 'Citizen Suits' provision of the 1972 Act. The court granted the motions of three of the defendants, ruling that the allegations in the complaint evidenced acts or powers too indirectly related to control of the pollution to state a cause of action. The court denied the other four motions and ordered the action to proceed against the remaining defendants. (Deckert-Florida)
W75-04591

EPA POLICY ON INJECTION WELLS.
Pollution Control Guide, Vol. 1, paragraph 2416, p 2246-2249, 1973, 4 p.

Descriptors: *Injection wells, *Waste disposal wells, *Environmental effects, *Well permits, *Regulation, Legal aspects, Drilling, Subsurface waters, Water pollution, Water pollution sources, Water law, Environmental control, Water quality control, Federal government, Local governments, Deep-well pumping, Well data, Waste disposal.
Identifiers: *Environmental policy, Administrative regulations.

The Environmental Protection Agency (EPA) policy on subsurface emplacement of fluids by well injection is to protect the subsurface from pollution, ensure that engineering and geological safeguards are adhered to, and encourage alternative means of disposal. The emplacement of fluids by subsurface injection often is considered by government and private agencies as an attractive mechanism for final disposal. Improper injection of municipal or industrial wastes or injection of other fluids for storage or disposal to the subsurface environment could result in serious pollution of water supplies. The effects of these injections could result in environmental damage requiring complex and costly solutions on a long-term basis. The EPA will oppose emplacement of materials by subsurface injection without strict controls and a clear demonstration that such emplacement will not interfere with present or potential use of the subsurface environment. Before using subsurface injection, all reasonable alternative measures must have been explored and found environmentally less satisfactory. Included are parameters to provide regulatory agencies with sufficient information to evaluate the environmental acceptability of any proposed well injection. (Proctor-Florida)
W75-04592

E.P.A. POLICY TO PROTECT THE NATION'S WETLANDS.
Pollution Control Guide, Vol. 1, paragraph 2415, p 2244-2245, 1973, 2 p.

Descriptors: *Water policy, *Wetlands, *Environmental control, *Waste water(Pollution), *Waste water treatment, Water pollution effects, Marshes, Swamps, Aquatic habitats, Aquatic environment, Waste water disposal, Water resources development, Water law, Water pollution, Water management(Applied), Water allocation(Policy), Wildlife conservation, Resource allocation, Conservation, Federal government, Administrative agencies.
Identifiers: Administrative regulations, Environmental policy.

The Environmental Protection Agency (EPA) has espoused a policy to preserve wetland ecosystems and to protect them from destruction through wastewater pollution or nonpoint source discharges. The EPA advocates the development and construction of waste water treatment facilities, because the Nation's wetlands are an irreplaceable water resource that must be preserved. The EPA's policy is to minimize alterations in the quantity or quality of the natural flow of water that nourishes the wetlands. The policy also calls for protection from environmentally unsound dredging and filling, and solid waste management. Through its education and enforcement programs EPA hopes to prevent violation of applicable water quality standards. In compliance with the National Environmental Policy Act of 1969, the EPA will not grant federal funds for the construction of municipal waste water treatment facilities except where no other alternative is feasible. The Department of the Interior will be consulted to determine the impact of treatment programs on fish and wildlife. (Proctor-Florida)
W75-04593

INTERNATIONAL ENVIRONMENTAL BIBLIOGRAPHIES--ENVIRONMENTAL LEGISLATION--NORTH AMERICA.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-04594

WATER QUALITY STANDARDS: THE FEDERAL PERSPECTIVE--PROGRESS TOWARD OBJECTIVES,
A. Hirsch, J. L. Agee, and R. S. Burd.
Journal Water Pollution Control Federation, Vol 40, No 9, p 1601-1606, Sept 1968, 6 p.

Descriptors: *Water quality control, *Water quality standards, *Water Quality Act, *Water quality, *Federal Water Pollution Control Act, Waste disposal, Water pollution, Water pollution sources, Water pollution treatment, Water treatment, Sewage treatment, Waste water treatment, Legislation, Local governments, State governments, Federal government, Governmental interrelations, Administrative decisions, Environmental control.
Identifiers: Administrative regulations, *FWPCA Amendments of 1972, Environmental policy.

The Water Quality Act of 1965 was enacted to provide for the establishment of water quality standards. The standards contemplated by the Act involve the specification of the uses of a given body of water, determination of criteria to maintain the water quality necessary to support those uses, and development of a compliance plan to achieve and maintain these criteria. The Department of the Interior will approve standards submitted by the states only if the states provide for upgrading waters now polluted and protecting waters already clean. The intent of the Act is to get ahead of the pollution problem. The Federal Water Pollution Control Act's objective has been to jointly establish these standards, which would spearhead an accelerated pollution control effort. The FWPCA makes the establishment of a joint state-federal effort its top priority assignment. A significant aspect of the new water standards is that the implementation plans call for secondary treatment of both municipal and industrial wastes. (Proctor-Florida)
W75-04595

WATER QUALITY CONTROL--THE ROLE OF THE INTERSTATE AGENCY,
Delaware River Basin Commission, Trenton, N.J.
J. F. Wright.
Journal Water Pollution Control Federation, Vol 40, No 8, Part 1, p 1403-1407, August 1968, 5 p.

Descriptors: *Interstate commissions, *Administrative agencies, *Delaware River Basin Commission, *Water quality control, *Watershed management, Water pollution, Political aspects, State governments, Water policy, Water resources development, Water law, Regional development, Planning, Resources allocation, Social aspects, Administrative decisions, Governmental interrelations, Comprehensive planning, Pollution abatement, Water pollution control, Environmental control, Water policy.
Identifiers: Administrative regulations, Environmental policy, Effluent limitations.

The role of the interstate agency in water pollution control is to formulate a comprehensive regional water quality plan. Agencies must work out cooperative programs to implement regional plans. Plan development and application includes the establishment of a division of labor among federal, interstate, state and local authorities. The agency must insure the feedback to the plan of modifications from research and operational experience. All agencies must be prepared to use police powers to insure compliance. One of the most important features in a successful water quality management plan is the sustained interest in competent operation and maintenance of treatment plants. Plants must be well constructed and operated by qualified personnel in order to be effective. The Delaware River Basin Commission is an example of a successful agency's formulation of water quality standards and effective implementation of them. The Commission also illustrates the flexibility and adaptability of an administrative agency to the changing purposes and techniques of a pollution control program. (Proctor-Florida)
W75-04596

AQUATIC PLANT CONTROL PROGRAM, STATE OF FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
Available from National Technical Information Service, Springfield, Va 22161, U.S. Dept. Commerce, as EIS-FL-73-1488-F, $7.60 in paper copy, $2.25 in microfiche. September 11, 1973. 201 p, 1 map, 5 photo, 11 graph, 22 tab, 12 diagram.

Descriptors: *Environmental effects, *Water hyacinth, *Florida, *Aquatic weed control, *2,4-D, Aquatic plants, Aquatic environment, Aquatic habitat, Federal government, Clogging, Open channels, Surface waters, Rivers, Streams, Lakes, Herbicides, Water pollution, Flood control, Water quality control, Navigable waters, Chemical properties, Legislation, Aquatic animals, Aquatic weeds.
Identifiers: *Environmental Impact Statements.

Efforts to control the growth and dispersal of water hyacinths in the waters of Florida include the use of the chemical 2,4-D (2,4-dichlorophenoxyacetic acid) in dimethylamine salt formulation and use of biological control agents or other methods in an integrated program when they are feasibile. The explosive growth rate of these exotic plants results in dense clogging of Florida's waterways, restricting navigation and streamflow and adversely affecting the aquatic environment. Removal of these plants will improve navigability and the aquatic habitat. The principal adverse effects will be temporary depletion of dissolved oxygen and increase in the buildup of organic bottom sediment, as well as the possibility of other unforeseen effects due to the incomplete understanding of the long-term effects of repeated 2,4-D applications. Biological and mechanical control methods were considered, but the proposed method is presently the most effective and feasible method available. Although there is little question as to the need to remove the hyacinths, some environmentalists expressed concern over the exten-

sive use of 2,4-D while there remains some uncertainty regarding possible adverse effects. (Deckert-Florida)
W75-04598

AQUATIC PLANT CONTROL.
For primary bibliographic entry see Field 6E.
W75-04599

ACID MINE WATER, A BIBLIOGRAPHY,
Office of Water Research and Technology, Washington, D.C.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-239 523 $13.00 paper copy, $2.25 microfiche. Water Resources Scientific Information Center, Report WRSIC 75-202, February 1975, 564 p.

Descriptors: *Acid mine water, *Bibliographies, Abstracts, *Coal mine wastes, Industrial wastes, *Mine drainage, *Strip mines, Waste water treatment, Water pollution control.

This report, containing 365 abstracts, is another in a series of planned bibliographies, in water resources to be produced from the information base comprising SELECTED WATER RESOURCES ABSTRACTS (SWRA). At the time of search for this bibliography, the data base had 77,890 abstracts covering SWRA through November 15, 1974 (Volume 7, Number 22). Author and subject indexes are included.
W75-04625

MANURE APPLICATION GUIDELINES FOR THE PACIFIC NORTHWEST,
Oregon State Univ., Corvallis. Dept. of Agricultural Engineering.
T. L. Willrich, D. O. Turner, and V. V. Volk.
Paper No 74-4061 presented at the 1974 Annual Meeting, American Society of Agricultural Engineers, Oklahoma State University, Stillwater, June 23-26, 1974, 12 p. 5 tab, 2 ref.

Descriptors: *Pacific Northwest U.S., *Farm wastes, *Waste disposal, *Equations, Nitrates, Fertilizers, Nitrogen, Leaching, Livestock, Waste storage, Lagoons, Irrigation, Volatility.
Identifiers: *Application rates, *Land spreading.

Most farmers who apply manure to land know very little about how much to apply. Research must supply the answers before ground water supplies are polluted. Generally nitrogen is the limiting factor in manure application because it readily moves in the soil whereas phosphorus and potassium are more static. Accurate rational equations must be developed to estimate: (1) the amount of nitrogen which should be added to the soil to maximize crop yields and to satisfy the normal losses of nitrogen from the soil and the losses that occur when manure nitrogen is substituted for synthetic nitrogen, and (2) the amount of residual manure nitrogen which remains for soil incorporation after subtracting all losses which occur before soil incorporation. Equations are presented, but future modifications and refinements are essential to correct weaknesses and errors which currently exist. (Russell-East Central)
W75-04631

EPA PREPARING TO 'RAILROAD' THROUGH NEW POLLUTION RULES COVERING CATTLE FEEDLOTS,
Beef, Vol 9, No 12, p 4-5, August, 1973.

Descriptors: *Feed lots, *Cattle, *Farm wastes, Effluents, *Water pollution control, *Regulation, Livestock, Runoff.
Identifiers: *Zero discharge.

The U. S. Environmental Protection Agency, under a court order, is attempting to write regulating guidelines for effluent limitations on all industries. The proposed regulations do not allow any effluent discharge, regardless of weather conditions. Industry leaders are puzzled about the regulations and are hoping to have some influence on them when they appear in the Federal Register. The regulations must be put into effect by October 18, 1973--the court-imposed deadline. (Frantz-East Central)
W75-04639

PIERCED STEEL PLANKING SURFACING FOR FEEDLOT RUNOFF CONTROL,
South Dakota State Univ., Brookings. Water Resources Inst.
For primary bibliographic entry see Field 5D.
W75-04644

AUTHORIZATION FOR SECRETARY OF INTERIOR TO ACQUIRE ADDITIONAL WETLANDS.
Committee on Merchant Marine and Fisheries (U.S. House).
For primary bibliographic entry see Field 6E.
W75-04651

CONTROLS ON THE QUALITY VARIATIONS OF SOME CARBONATE SPRING WATERS,
Goettingen Univ. (West Germany). Sediment-Petrographisches Institut.
For primary bibliographic entry see Field 2F.
W75-04710

AN EXAMINATION OF ALTERNATIVE METHODS FOR EMPLOYING BOOMS TO CONTAIN OIL SPILLS IN NAVY HARBORS,
Naval Postgraduate School, Monterey, Calif.
J. J. Larson.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-783 790, $5.25 in paper copy, $2.25 in microfiche. Ms Thesis, p 101, June 1974. 13 fig, 35 ref, 5 append.

Descriptors: *Oil spills, *Water pollution control, Decision making, Evaluation, Oil pollution, Cost-benefit analysis, Harbors, *Alternative planning, *Pollution abatement.
Identifiers: *Floating barriers, *Containment booms, Alternative methods.

One portion of the pollution problem was addressed, that is, methods of employing booms to contain oil spills in harbors controlled by the U.S. Navy. Containment of a spill is an essential step in the process of cleaning up a spill and reducing pollution. A plan was formulated which will enable a decision maker to evaluate and rank three difined methods for deploying oil spill containment boom. The plan is based on a utility analysis of each method, with a decision analysis technique to determine the relative importance of various parameters effecting the utility of each method. Although these parameters are related, they are independent and can be considered individually. The plan identifies the data that must be otained and demonstrates a method for organizing and manipulating the data. This plan can be of assistance to the decision maker in determining an optimum method for boom employment at each naval activity and then determining containment device procurement requirements. (Sims-ISWS)
W75-04720

ENGINEERING A VICTORY FOR THE ENVIRONMENT: A CITIZEN'S GUIDE TO THE U.S. ARMY CORPS OF ENGINEERS,
Institute for the Study of Health and Society, Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-04755

PLANNING FOR WATER QUALITY IN THE BEAR RIVER SYSTEM IN THE STATE OF UTAH.
Utah Water Research Lab., Logan.
PRWG-142-1, prepared for State of Utah Department of Social Services, Division of Health, Bureau of Environmental Health. March 1974. 95 p, 12 fig, 7 tab, 19 ref.

Descriptors: *Water quality, *Planning, *Management, *Water pollution control, *River basins, *Data collections, Data processing, Federal Water Pollution Control Act, Baseline studies, Analytical techniques, Hydrologic data, *Utah, Political aspects.
Identifiers: *Bear River(Utah), Effluent limitations, Demographic activities.

A functional planning program is presented to aid in the development of comprehensive water quality management plans for the Bear River system pursuant to the objectives of the Federal Water Pollution Control Act, including 1972 amendments. The objectives will be reached using a two stage process: (1) point sources will be required to meet effluent limitations based on current water pollution control technology, and (2) higher prescribed control levels are to be achieved to meet the 1983 requirements of water quality suitable for fishing and swimming. A program design, an initial analysis of available data, and a priority listing of water pollution necessary for developing a Section 303 (e) basin plan are provided. Physical, chemical, economic, political, and demographic activities which have an impact upon a river basin are described. In the compilation and analysis of the baseline information within the scope of this preliminary study, the following specific objectives were achieved: (1) determination of availability of hydrological and water quality data, (2) assessment of water quality problems in the basin; (3) collection of data according to sources which are local or basin wide, statewide, regional, or federal, (4) presentation of the collected data in a form useful to planners and government officials, (5) preliminary analysis of data problems and gaps and requirements for obtaining additional data, and (6) development of a preliminary basin analysis methodology and data retrieval and updating through use of computer systems. (Diefendorf-North Carolina)
W75-04757

LIVING CITY, (MELBOURNE, AUSTRALIA, REVIEW OF OPERATIONS, 1972-73).
Melbourne and Metropolitan Board of Works, (Australia).
For primary bibliographic entry see Field 3D.
W75-04762

WATER-DISTRIBUTION RESEARCH AND APPLIED DEVELOPMENT NEEDS.
American Water Works Association, New York, Research Committee on Distribution Systems.
For primary bibliographic entry see Field 6B.
W75-04763

THE MARINE ENVIRONMENT AND TOXIC SUBSTANCES (WHEN WAS THE LAST TIME YOU HAD A GOOD SWORDFISH STEAK),
For primary bibliographic entry see Field 6E.
W75-04768

THE LAW OF MARITIME OIL SPILLS,
For primary bibliographic entry see Field 6E.
W75-04770

BILL TO ESTABLISH THE POTOMAC NATIONAL RIVER IN THE STATES OF MARYLAND, VIRGINIA, WEST VIRGINIA, AND THE DISTRICT OF COLUMBIA AND FOR OTHER PURPOSES.
For primary bibliographic entry see Field 6E.
W75-04772

WATERWORKS DEPARTMENT IN CERTAIN CITIES.
For primary bibliographic entry see Field 6E.
W75-04774

UNION OF CONCERNED SCIENTISTS V. ATOMIC ENERGY COMM'N. (REVIEW OF ORDERS OF AEC LICENSING NUCLEAR POWERPLANT).
For primary bibliographic entry see Field 6E.
W75-04775

IN RE HIGHWAY US-24, IN BLOOMFIELD TOWNSHIP, OAKLAND COUNTY (HIGHWAY CONDEMNATION PROCEEDING).
For primary bibliographic entry see Field 6E.
W75-04776

WATER POLLUTION--LIQUID WASTES (AS AMENDED).
Michigan Legislative Service, Vol 2, Public Act No 86, H.B. No 5367, p 177-181, approved April 18, 1974, (1974). 5 p.

Descriptors: *Michigan, *Legislation, *Waste water disposal, *Liquid wastes, Water pollution sources, Treatment facilities, Government finance, Economic aspects, Local governments, Administration, Adoption of practices, Construction, Administrative agencies, Jurisdiction, Planning, Sludge, Sludge disposal, Resources development.
Identifiers: *Administrative regulations, *Effluent charges, State policy, Licenses.

Michigan legislation prevents the discharge of untreated or inadequately treated sewage or other liquid wastes into any waters of the state. The act also provides financial assistance to local agencies for the construction of treatment works to prevent such discharge. A fund is created known as the state water pollution control fund to provide that financial assistance. A grant will not be made for the building and erection of a treatment works until the local agency's governing body has adopted and submitted to the water resources commission a comprehensive long range plan for the control of pollution in the area within its jurisdiction. The commission will promulgate procedures for establishing the priority of eligible projects and for certifying projects for an allocation of grants for treatment works construction. Projects entitled to construction grants will be certified to the administering federal agency from the project list established by the water resources commission and approved by the legislature. (Sperling-Florida)
W75-04777

AMELIORATION OF EFFECTS OF OIL SPILLS.
Council on Environmental Quality, Washington, D.C.
Federal Register, Vol 37, No 176, p 18411-18412, September 9, 1972.

Descriptors: *Regulation, *Oil spills, *Legislation, *Federal Water Pollution Control Act, *Water pollution sources, Water pollution, Water pollution control, Pollution abatement, Oil, Oily water, Water pollution effects, Administrative agencies, Interagency cooperation, Water resources, Oil industry, Environmental effects, Federal government, Investigations.
Identifiers: *Administrative regulation, Hazardous substances(pollution).

In 1971, the Council on Environmental Quality promulgated the National Oil and Hazardous Substances Contingency Plan, pursuant to the provisions of the Federal Water Pollution Control Act, as amended. Experience with that plan has demonstrated to the National Response Team, which is responsible for planning and coordination of spill response activities, that an amendment should be made. The section of the plan to be amended currently provides for notice to a ship or facility operator of an indication of federal interest and potential action in a spill. The purpose of such a notice is to implement that portion of the FWPCA which authorizes the President to remove a spill unless he determines such removal will be done properly by the operator of the vessel or facility from which the discharge occurs. The NRT advised that this purpose could better be served by clarifying the role of the On-Scene Coordinator in making determinations respecting actions to be taken to ameliorate the effects of a spill and that clarification is the purpose of this amendment. (Ritchie-Florida)
W75-04779

BERGEN COUNTY SEWER AUTHORITY V. HACKENSACK MEADOWLANDS DEVELOPMENT COMMISSION (SEEKING DECLARATORY JUDGMENT THAT PLAINTIFF NOT SUBJECT TO LAND USE REGULATIONS OF DEFENDANT IN CONSTRUCTING ADDITION TO SEWAGE PLANT).
For primary bibliographic entry see Field 6E.
W75-04780

OFFSHORE OIL DRILLING AT SANTA BARBARA, PART 1,
For primary bibliographic entry see Field 6E.
W75-04784

INTERIM NUCLEAR LICENSING.
Committee on Merchant Marine and Fisheries (U. S. House).
For primary bibliographic entry see Field 6E.
W75-04788

ROUTINE SURVEILLANCE ALTERNATIVES FOR WATER QUALITY MANAGEMENT,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5A.
W75-04803

TV INSPECTIONS SLASH SEWER COSTS $300 PER REPAIR,
St. Louis Metropolitan Sewer District, Mo.
S. J. McLaughlin.
The American City, Vol 89, No 9, p 51-52, September, 1974.

Descriptors: *Maintenance, Sewer systems, Pipes, Equipment, Construction, Flow, Planning, Costs.
Identifiers: *Sewer repair, *Television inspection, Preventive maintenance.

A preventive maintenance program at the Metropolitan St. Louis Sewer District was found to reduce costs of sewer repair drastically. In the last year, 2.1 million feet of sewer lines were inspected by closed-circuit television cameras in order to find the causes of failures such as caveins and backups. The previous cost of digging up a trouble area was about $400; each television inspection costs $33, with average repairs costing $40. This saves over $300 per problem. In addition, some critical areas for regular line cleaning operations were identified and computerized. For example, a leaf burning ban is a major cause of expected sewer blockage in the fall when leaves are swept into gutters. Preliminary inspections are also made of each sector of pipe to be cleaned. Wet weather information is obtained from measuring devices placed through manholes. Sewers are cleaned by rodding equipment or bucket machines. By the combination of preventive maintenance, flow surveillance, and equipment improvement, costs of repairs have been cut by about $150,000 per year. (Prague-FIRL)
W75-04830

PHILOSOPHY ON LIVESTOCK WASTE REGULATION,
Missouri Univ., Columbia.
D. R. Levi.
Paper No. 71-918, presented at 1971 Winter Meeting of the American Society of Agricultural Engineers, Chicago, Illinois, December 7-10, 1971. 10 p.

Descriptors: *Farm wastes, *Livestock, *Regulation, *Legal aspects, Feed lots, Agriculture, Biochemical oxygen demand, Effluent, Water pollution control, Odor, Zoning, Waste treatment, Damages.
Identifiers: Nuisances, Site selection.

There are two types of regulations under which a livestock farmer can be prosecuted or fined for environmental damage. The first are public regulations, such as the States and Federal Government have promulgated in the Water Quality Act of 1965 and comparable State bills. These laws usually provide objective criteria for matter discharged into water or air, for example, maximal BOD levels for effluents discharged into streams. Private regulation usually takes the form of nuisance laws, where the more objective human tolerance for noise, odor, or water pollution is given a legal form. A farmer who endangers his neighbors' health, well-being, or livelihood by polluting their water supplies, or making their air foul-smelling is subject to damage suits, injunctions, fines, or a combination of these. Zoning helps to minimize suits since it insures that the land use is not unreasonable in itself. However, a farmer in a zoned agricultural area may still produce a nuisance and be taken to court. Selecting a site for livestock pens as far as possible from homes and complying with all existing State laws and codes cannot only abate the pollution generated by a farm creating a hazard but indeed has done what the law requires. Waste treatment facilities are the single best insurance against legal action, and farmers and agricultural engineers should cooperate to draft realistic and practical laws in agricultural waste control. (East Central State College)
W75-04838

MANURE PROMOTED FOR CROPLAND.
Calf News, Vol 10, p 18, December, 1972.

Descriptors: *Farm wastes, *Crops, *Fertilizers, Rates of application, Salts, Nitrates, Irrigation, Costs, Nebraska, Nutrients, Feed lots, Soil contamination, Water pollution, Soils, Slopes.
Identifiers: Soil conditioners.

Manure acts as a fertilizer, buffers alkaline soils, and improves such soil characteristics as porosity, granulation, water infiltration rate, and moisture retention. Residual effects may result in a profit even where handling costs exceed one-year value. Salt accumulation should be checked. Maximum application rates recommended are 10-15 tons/acre depending on precipitation and irrigation practices. (East Central State College)
W75-04839

THE RELATIONSHIP BETWEEN ANIMAL WASTES AND WATER QUALITY.
President's Water Pollution Control Advisory Board, Washington, D.C.
Report of Recent Meetings, October, 1971 and January, 1972. 33 p.

Descriptors: *Farm wastes, *Water quality, Recycling, Waste disposal, Lagoons, Basins, Fuels, Oil, Gases, Fertilizers, Feeds, Research and development, Feed lots, Water pollution, Runoff, Colorado, Nebraska, Kansas, Illinois, Indiana, Public health, Monitorings, Strip mines.
Identifiers: Land disposal, Refeeding, Site selection.

The President's Water Pollution Control Advisory Board held meetings in Colorado 26-29 Oct 71 and

in Illinois and Indiana 24-28 Jan 72 to heat testimony on the animal waste pollution problem. Field trips were combined with both meetings. The paper summarizes the hearings. As a consequence of the meetings, the Board presented ten recommendations to EPA. That on uses of animal wastes is: 'The Board believes that recycling animal wastes back onto the land is the best practical approach in most situations, particularly for smaller operators, through the use of catchment basins, lagooning systems, and/or solid waste handling techniques. There are also other possible uses which should be given full consideration. Testimony presented to the Board indicates that promising possibilities exist in converting animal wastes into fuels such as oil or back into animal feeds. It is recommended that the Environmental Protection Agency give high priority to funding for research and development projects which may develop practicable and safe alternate uses for animal wastes.' (East Central State College)
W75-04840

ARKANSAS STATE GAME AND FISH COMM'N. V. EUBANK (SUIT ENJOIN PROPOSED PARTIAL FISH KILL).
For primary bibliographic entry see Field 6E.
W75-04844

A SURVEY OF FEDERAL AND MISSISSIPPI ENVIRONMENTAL LAW WITH AN EXAMINATION OF ITS EFFECT ON LAND DEVELOPMENT,
Mississippi Univ., University. School of Law.
For primary bibliographic entry see Field 6G.
W75-04845

ECONOMICS, (LITERATURE REVIEW),
Georgia Inst. of Tech., Atlanta, Ga. Envrionmental Resources Center.
L. D. James.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1611-1618, June, 1974. 77 ref.

Descriptors: *Costs, Water resources, *Water resources development, Water pollution, *Reviews, Legislation, *Planning, Management, *Bibliographies.

Two important government documents on water resources planning procedure were published in 1973. New standards for federal water planning in the U.S. were released by the U.S. Water Resources Council. The new approach is that enhancement of environmental quality is included with economic efficiency as planning objectives, and measurement is made of both environmental and economic effects. An increase in planning discount rate to 6.875 percent and a new emphasis that benefits be paid for by the beneficiaries are radical changes from past practice. A five year study by the National Water Commission was completed dealing with water management. 'Zero discharge' was rejected as a goal by the Commission, recommending that the cost of pollution be paid by those who produce it. The evaluation of the causes of conflict between environmental quality and water resources for economic gain was discussed in an assemblage of 28 papers by Goldman for the National Water Commission. (Leibowitz-FIRL)
W75-04846

EFFECTS OF POLLUTION ON FRESHWATER FISH, (LITERATURE REVIEW),
National Water Quality Lab., Duluth, Minn.
For primary bibliographic entry see Field 5C.
W75-04848

OXYGEN SAG AND STREAM PURIFICATION, (LITERATURE REVIEW),
Georgia Dept. of Natural Resources, Atlanta.
For primary bibliographic entry see Field 5B.
W75-04849

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

CONTROL STRATEGY DEVELOPMENT STUDY, SAN FRANCISCO WASTEWATER MASTER PLAN,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-04352

ASCE URBAN WATER RESOURCES RESEARCH PROGRAM, 1967-1974,
American Society of Civil Engineers, New York.
For primary bibliographic entry see Field 4A.
W75-04440

NUMERICAL SIMULATION OF UNSTEADY FLOW HYDRAULICS OF TRUCKEE RIVER,
Desert Research Inst., Nevada Univ., Reno.
V. L. Gupta.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 239 414, $4.25 paper copy, $2.25 microfiche. Completion Report, Technical Report Series H-W, Publication No 21, July 1974. 69 p, 21 fig, 8 tab, 31 ref, 2 append. OWRT A-057-NEV (1), 14-31-0001-4028.

Descriptors: River flow, Numerical analysis, *Unsteady flow, *Nevada, *California, Methodology, *Simulation analysis, Model studies, *Flood routing, *Hydrograph analysis.
Identifiers: *Truckee River(Nev-Calif), Implicits method, Sensitivity analysis.

Modelling methodology using finite difference calculus is presented to investigate the simulation capability of the unsteady flow regime in a mountainous stream. A case study of Truckee River is presented where field survey information was utilized in describing the geometric and hydraulic elements of the river at twenty-five reaches. Modelling exercises included were (a) reproducing observed flood hydrographs of 1963 event, (b) bihourly streamflow hydrographs, (c) flood routing of U.S. Army Corps of Engineer's 'Intermediate Regional' and 'Standard Project Flood' events and (d) routing studies of hydraulic surge propogation. Sensitivity analysis indicates that the agreement between observed and computed hydrographs is largely dependent upon the lateral flow regime.
W75-04444

A REGIONAL MODEL OF THE FUTURE DEMAND FOR TRANSPORTATION: THE CASE OF BARGE TRANSPORTATION,
Institute for Water Resources (Army), Alexandria, Va.
B. R. Sasaki.
IWR Paper 74-P3. October 1974. 149 p, 12 fig, 30 tab, 71 ref, append.

Descriptors: *Methodology, *Demand, *Barges, *Transportation, *Economics, *Ohio River, Regions, Coals, Supply, Linear programming, Projections, Technology, *Model studies, Industries, Estimating, Equations, Operations research, Regional analysis.
Identifiers: Commodities, Cost minimization, Discriminant analysis.

Reported is a study which developed a methodology for projecting the future demand for barges in the transport of bituminous coal to selected economic centers. The methodology is based on a general equilibrium model of the supply and demand for specific commodities and then an analysis of the model share consequences of the spatial alignment of supply and demand centers. Demand for transportation is assumed to be derived from the demand for commodities over space. Division of traffic between transport modes is assumed to be a function of the rate and service characteristic of competing modes. Empirical estimates are made of the demand for barge transportation of coal to three functional economic areas of the Ohio River Region--Pittsburgh, Cincinnati, and Evansville. The comprehensive model consists of three interrelated economic models. Demand functions for coal in each area are projected, supply functions for coal production areas competing for these markets are projected, and an equlibrium allocation of trade flows is estimated by linear programming, utilizing minimum average transport cost from each originating region to each destination region. Choice of transport mode is estimated by utilizing discriminant functions based on current (1970) rate and service characterstics for competing modes. (Bell-Cornell)
W75-04520

ON THE VULNERABILITY OF ECOSYSTEMS DISTURBED BY MAN,
California Univ., Berkeley. Lawrence Berkeley Lab.
For primary bibliographic entry see Field 5C.
W75-04521

A TWO-DIMENSIONAL MULTI-STAGE PROGRAMMING MODEL: WITH APPLICATION TO RESERVOIR SYSTEMS,
Army Construction Engineering Research Lab., Champaign, Ill.
For primary bibliographic entry see Field 4A.
W75-04523

EXPECTATION AND DISPERSION MATRICES FOR THE ESTIMATION OF DISTRIBUTIONS ASSOCIATED WITH DISCRETE RESERVOIRS,
Natal Univ., Durban(South Africa).
For primary bibliographic entry see Field 4A.
W75-04525

AN ECONOMIC ANALYSIS OF AGRICULTURAL LAND USE PRACTICES TO CONTROL WATER QUALITY,
Cornell Univ., Ithaca, N. Y.
For primary bibliographic entry see Field 5G.
W75-04526

THE DESIGN OF A LIVESTOCK WATER DISTRIBUTION SYSTEM--LARGE SCALE,
Nebraska Univ., Lincoln. Agricultural Experment Station.
For primary bibliographic entry see Field 3F.
W75-04527

MODELING SEWAGE TREATMENT PLANT INPUT BOD DATA,
Wisconsin Univ., Madison. Dept. of Civil and Environmental Engineering.
For primary bibliographic entry see Field 5D.
W75-04528

DEMAND FOR IRRIGATION: A CASE STUDY OF GOVERNMENT TUBE-WELLS IN UTTAR PRADESH,
Institute of Economic Growth, Delhi (India).
For primary bibliographic entry see Field 6D.
W75-04529

ENVIRONMENTAL VALUES AND WATER QUALITY PLANNING,
California Univ., Davis. Div. of Environmental Studies.
For primary bibliographic entry see Field 5G.
W75-04530

COMPUTER USE FOR RIVER REGULATION,
Corps of Engineers, Portland, Oreg. North Pacific Div.
For primary bibliographic entry see Field 4A.
W75-04531

OPTIMAL OPERATION OF MULTIPLE RESERVOIR SYSTEM,
State Univ. of New York, Buffalo. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-04532

ADOPTION OF NETWORK TECHNIQUES IN THE PLANNING AND EXECUTION OF IRRIGATION AND POWER PROJECTS,
Hindustan Construction Col. Ltd., Bombay (India).
For primary bibliographic entry see Field 3F.
W75-04533

WATER MANAGEMENT SYSTEMS,
Technion--Israel Inst. of Tech., Haifa.
For primary bibliographic entry see Field 3F.
W75-04538

SOLUTION OF SIMULTANEOUS PARTIAL DIFFERENTIAL EQUATIONS: AN EXTENSION OF PDEL,
California Univ., Los Angeles.
E. S-h. Choi.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 432, $5.75 in paper copy, $2.25 in microfiche. Msc, Thesis. 1973. 122 p, 7 fig, 2 tab, 37 ref, 2 append. OWRT B-150-CAL(6).

Descriptors: *Simulation analysis, *Equations, *Algorithms, Digital computers, *Computer programs, Numerical analysis, Environmental engineering, *Air pollution, Pollutants, Costs, Time, Mathematical models, Systems analysis, *Distribution systems.
Identifiers: *Simulation languages, *Simultaneous partial differential equation.

The capability of PDEL (Partial Differential Equation Language) is extended to solve simultaneous partial differential equations. Specifically, a new portion of the PDEL translator is designed to handle simultaneous 1-, 2-, and 3-dimensional elliptic, parabolic and hyperbolic equations and to actually implement the model for solving simultaneous 2-dimensional parabolic equations. The extension is accomplished by modifying the existing partial differential equation solution algorithm to allow for incorporation of an ordinary differential equation solution module rather than by implementing entirely new and lengthy algorithms to PDEL. A survey of several existing methods for solving simultaneous partial differential equations and a survey of ordinary differential equation algorithms are presented. The Fourth-order Range-Kutta method is chosen to be implemented in this extension of PDEL. The newly implemented ordinary differential equation solution module is tested and found to be reasonably accurate. When incorporated into the partial differential equation solution scheme for solving simultaneous partial differential equations, the overall performance is satisfactory. For solving several partial differential equations simultaneously, there is only a slight increase in computer time and cost over those required for solving one such equation. The PDEL translator is modified so that only a few new statements need to be added to a PDEL program in order to handle simultaneous partial differential equations. (Bell-Cornell)
W75-04539

PARAMETER IDENTIFICATION IN DISTRIBUTED SYSTEMS USING A DIGITAL SIMULATION LANGUAGE: AN EXTENSION OF PDEL,
California Univ., Los Angeles.
C. M. Lam.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 431, $4.75 in paper copy, $2.25 in microfiche. MSc Thesis. 1972. 84 p, 4 fig, 19 tab, 15 ref. OWRT B-150-CAL(5).

Descriptors: *Simulation analysis, *Computer programs, Digital computers, Algorithms, Model studies, Data collections, Equations, *Aquifers, *Optimization, Withdrawal, Heat, Diffusion, Systems analysis, Thermal pollution.
Identifiers: Parameter identification, Simulation languages, *Fletcher-Powell method, Partial differential equation, Inverse problems, Convergence, *Heat diffusion.

The capability of PDEL (Partial Differential Equation Language) is extended to handle the parameter identification problem. The following goals are accomplished: (1) a comparison of the existing parameter identification algorithms and the choosing of the most suitable one to be implemented into the existing PDEL system; and (2) the design and construction of a new portion of the parameter identification problems for those equations that can be solved by the existing PDEL system. The comparison study shows that the Fletcher-Powell method is the most suitable algorithm to be used because: its coverge rate is reasonably fast; a large set of problems can be handled; and only minor changes to the existing PDEL system are required. The translator is designed in such a way that, besides specifying the necessary details required for solving the partial differential equation in PDEL, the user has only to add several statements to achieve the parameter identification goal. In practically all presently available languages, including PDEL, parameter identification problems have to be treated by the user on a trial and error basis. The main goal of the extension of PDEL is to ease and speed up parameter identification for a user of PDEL by avoiding such a trial and error process. Two example problems, optimal control of an aquifer, and heat diffusion, are given. (Bell-Cornell)
W75-04540

APPLICATION OF THE MAIN II WATER FORECASTING SYSTEM TO WYOMING COMMUNITIES,
Wyoming Univ., Laramie.
For primary bibliographic entry see Field 6D.
W75-04541

AN OPERATIONAL FRAMEWORK FOR COASTAL ZONE MANAGEMENT PLANNING.
Meta Systems, Inc., Cambridge, Mass.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 519, $8.75 in paper copy, $2.25 in microfiche. Completion Report, p 274, January 1975. 13 fig, 8 tab, 5 append. OWRT C-5208(No 4211)(1).

Descriptors: Management, Planning, Coasts, *Connecticut, *Model studies, Organizations, Political aspects, Institutional constraints, Programs, Urbanization, Legislation, Environment, *Optimization, *Governmental interrelations, *Algorithms, *Water demands, *Decision making.
Identifiers: Long Island Sound(Conn), *Coastal zone management, *Multi-level programming.

Since the decisionmaking and planning powers in coastal regions are different over a wide range of governmental bodies, a conceptual framework for coastal zone management is needed in order to simplify the process. Such a framework has been developed which attempts to distinguish clearly where in the coastal zone management process the different decisions need be made. Three sets of formal models have been constructed to aid planning. The first set of models checks for consistency between the overall demands placed upon the coastal zone and the environmental carrying capacity of the zone. The second set of models deals with identifying the appropriate goals to be used at the various levels in the planning hierarchy. The third set of models develops a multi-level planning algorithm to provide for efficient transfer of information between the levels of government involved in the coastal zone management process. The models have been tested on the coastal zone of the state of Connecticut.
W75-04558

OPTIMAL WEIGHTING FUNCTION IN WATER QUALITY MODELING,
University of Southern California, Los Angeles. Dept. of Electrical Engineering, and Materials Science.
For primary bibliographic entry see Field 5B.
W75-04614

EVALUATION PROBLEM OF STORM WATER ROUTING MATHEMATICAL MODELS,
Societe Grenobloise d'Etude et d'Applications Hydrauliques (France).
For primary bibliographic entry see Field 5D.
W75-04708

6B. Evaluation Process

WATER: CANADIAN NEEDS AND RESOURCES,
J. S. Cram.
Harvest House, Ltd., Montreal, Quebec. 3rd ed. July 1973. 206 p.

Descriptors: *Water resources development, *Water management(Applied), *Water allocation(Policy), Distribution systems, Water control, *Water law, *Water pollution control, Diversion, *Regional development, *Planning, *Canada, Water conservation, *Water demand, Water quality, Nonstructural alternatives, Potential water supply, Priorities.
Identifiers: Water information systems, Great Lakes Water Quality Agreement, Canada-Ontario Agreement, St. Lawrence River.

Attention to Canadian water resource management was precipitated by the pressure of United States demand for Canadian water resources and the public awareness of pollution dangers. The development of Canada's water resources and subsequent management are discussed. Factors such as conflicting demands, industrial and urban generated problems, disproportionate regional supplies and needs, absence of criteria and standards, and overlapping governmental jurisdictions, have necessitated the formulation of national policy and standards as well as activated citizen participation. Aspects and components of water development discussed include general characteristics of water, location of existing and potential supply sources, pollution problems (costs and forms), relationship with agriculture, and present inter-governmental control and efforts. The American and Canadian water issue is examined. Benefits from and objections to proposed water diversion schemes to export water to the U.S. and the Grand Canal plan to raise the level of the Great Lakes are presented. Improved and more responsible programs are suggested. Water resource planning is outlined in context of an economic, jurisdictional and institutional framework. Following a brief resume of past water conferences, an outline of regional priorities in water resource planning is presented. (Salzman-North Carolina)
W75-04359

THE BRANDYWINE: FIVE YEARS AFTER,
Pennsylvania Univ., Philadelphia. Inst. for Environmental Studies.
J. Benedict, and C. Wasserman.

February 1972. 102 p, 2 fig, 40 tab. EPA 16110EDC.

Descriptors: Ecology, *Urbanization, *Water management(Applied), *Watersheds(Basins), Water resources, *Water conservation, *Attitudes, *Land use, *Pennsylvania, Management, Alternative water use, Planning, Water quality, Water quality control, Water rights, Water utilization, Competing uses, Regulation, Natural resources, Water pollution, Watersheds(Basins), Land development, Habitat improvement, Water zoning.
Identifiers: Land use controls, *Brandywine watershed(Pa), Chester Co.(Pa), Brandywine Creek(Pa), Pollution, Development corporation.

The original Brandywine Creek Plan (Pennsylvania) would have used legal controls to regulate effects of spreading urbanization on the natural environment. However, citizens' disapproval precluded plan implementation. This report surveys residents' attitudes and changes in the Upper East Branch community, a prototype of a semirural area on the urban fringe, during the five years since the Plan's introduction. Three variables were studied: residents' perception of the area's growth, degree of community identification, and residents' perception of change in the natural environment. Many interviewees did not feel the natural environment changed over five years, and while most prefer the watershed to remain in its present state, a majority will accept some development, feeling that more residential growth is inevitable with older persons and farmers being replaced by younger people from urban areas. Residents were divided on whether mechanisms should be set up to handle problems before they arise or after problems occur. Residents were 2:1 against the Plan; those who believe their property will be directly involved were 3:1 against it. There is no relation between understanding of the plan and acceptance of it, and no social or demographic characteristics could be associated with acceptance of the plan. An increased awareness of the environment and the importance of protecting it seems to be the greatest long term impact of the Plan upon residents. A development corporation of local landowners could be considered for possible future use of the concepts of the Brandywine Plan. This would give landowners direct control over method, time, and place of development and control profits from sale of the corporation's holdings. (Grden-North Carolina)
W75-04360

EFFECTS OF AGRICULTURAL ACREAGE REDUCTION ON WATER AVAILABILITY AND SALINITY IN THE UPPER COLORADO RIVER BASIN,
Colorado Univ., Boulder. Dept. of Economics.
C. W. Howe, and D. V. Orr.
Water Resources Research, Vol 10, No 5, p 893-897, October, 1974. 4 tab, 2 fig, 8 ref.

Descriptors: *Colorado River, *Water policy, *Water rights, *Water management(Applied), *Salinity, *Desalination, Water supply development, Water quality, Irrigated land, Cost analysis, Costs, Economics, Economic impact, Water demand, Water yield improvement, Return flow, Model studies, Hydrologic models.

The increasing problems concerning the adequacy of water supply and water quality in the Upper and Lower Colorado River basins have created the need to explore alternative policies that can increase the efficiency of water use, reduce current consumptive uses, and improve water quality. Consideration is given to a policy that would reduce the amounts of irrigated acreage in the upper basin of the Colorado River thereby freeing water for alternative uses and reducing salt loadings. An analysis of costs, including estimates of regional income likely to be lost, indicated that a policy involving reduction in irrigated agricultural acreage compares favorably with other water augmentation and salinity reduction programs. (Mastic-Arizona)
W75-04368

PLANNING, MANAGEMENT AND ACCOUNTABILITY IN WATER RESOURCES RESEARCH,
Auburn Univ., Ala. Water Resources Research Inst.
J. C. Warman, and T. J. Joiner.
Available from WRRI, Auburn University, Auburn, Al. Price: $2.00. Available from the National Technical Information Service, Springfield, Va. 22161, as PB 239 413, $4.25 paper copy, $2.25 microfiche. Bulletin 21, November 1974. 54 p, 1 fig, 6 append, 25 ref. OWRT X-123(3748)(1)

Descriptors: *Planning, *Management, Water Resources, *Research priorities, Evaluation, Project planning, *Project purposes, *Project post-evaluation, *Project feasibility, Project benefits, *Universities.
Identifiers: *Accountability(responsibility).

This report focuses upon developing quality performance in water resources research through detailed attention to specific factors in program planning, management and accountability. University water resources research programs are problem oriented and are developed on an assessment of the needs of user groups. Two other factors condition this assessment wherever resources are limited and priorities must be established--value systems and policies. Both problems and objectives must be defined. Product objectives are defined in terms of knowledge gained resulting from the research while process objectives specify the research strategies to be followed in search of new knowledge. Other objectives include staff development, administration and communication. Teachers and researchers view their academic jobs as relatively free from authority; their relationships are associational rather than bureaucratic. There is a trend toward accountability; however, there generally is no way to effectively measure research productivity by conventional methods. The value of inputs cannot be directly compared with that of outputs. In this study evaluation means measuring achievement by utilizing controls devised and applied by the researcher to increase his personal effectiveness. The proposed control mechanism is designed to (1) define final and intermediate goals of the research project in terms of precise knowledge levels, (2) designate 'points of no return' for each knowledge level and (3) select checkpoints that trigger status reports indicating probability of achieving the required knowledge levels before their points of no return are reached.
W75-04439

A FRAMEWORK FOR UNCERTAINTY MANAGEMENT IN WATER RESOURCES PLANNING,
Decision Sciences Corp., Jenkintown, Pa.
D. F. Blumberg, J. A. Orlando, and A. B. Shostak.
Army Engineer Institute for Water Resources, IWR Contract Report 74-9, October 1974. 42 p, 10 fig.

Descriptors: *Risks, Water resources, *Planning, *Management, *Methodology, *Decision making, Effects, Floods, Damages, Economic impact, Streams, Evaluation, Forecasting, Costs, Alternative planning, Feasibility, *Flood control, Benefits.
Identifiers: *Risk analysis, *Decision theory, Sensitivity, Environmental impact.

A study has been made to develop a methodology to explicitly consider uncertainties--uncontrollable and unanticipated eventualities--that can adversely affect water resource planning. The study attempts to broaden the planning process by considering the changing nature of the environment for water resource planning and to provide a more efficient way to recognize uncertainties and anticipate their impacts prior to a decision to implement any specific actions. The ultimate purpose is to provide an anticipatory procedure that will help the planner avoid, where possible, the adverse consequences of unanticipated events. The management of uncertainty in water resource planning introduces a major choice involving risk taking: delay action and pay more (in time and resources) to further reduce uncertainty/risk, or take action now and accept the presence of uncertainty/risk. Described is the methodology for: (a) making this choice, recognizing the vital importance of the manager's perception of, and willingness to take, risk; and (b) development of procedures for structuring uncertainty, having made this choice. In essence, the methodology provides a quantitative basis for trading off resources (time and cost) to gain information versus the acceptance of uncertainty/risk. An example flood control problem is given. (Bell-Cornell)
W75-04519

A TWO-DIMENSIONAL MULTI-STAGE PROGRAMMING MODEL: WITH APPLICATION TO RESERVOIR SYSTEMS,
Army Construction Engineering Research Lab., Champaign, Ill.
For primary bibliographic entry see Field 4A.
W75-04523

ADOPTION OF NETWORK TECHNIQUES IN THE PLANNING AND EXECUTION OF IRRIGATION AND POWER PROJECTS,
Hindustan Construction Col. Ltd., Bombay (India).
For primary bibliographic entry see Field 3F.
W75-04533

THE ROLE OF WATER AND LAND RESOURCES IN ALLEVIATING MALNUTRITION AND HUNGER IN ARID REGIONS,
Bureau of Reclamation, Washington, D.C.
G. G. Stamm.
Presented at Deserts and Arid Lands Symposium, AAAS-CONYCT, Mexico City, 16 p, June 25-27, 1973. 5 fig, 1 tab, 6 ref.

Descriptors: *Human resources, *Water resources development, *Arid lands, *Crop production, *Technology, Irrigation, Agriculture, Water management, Irrigation systems, Land resources, Land management.

The lack of development and crop production in many arid lands of the world is a result of the absence of local technical knowledge and capital needed to explore for and tap water supplies. The first step, assuming that development and utilization of natural resources in these areas is desirable, would be the formation of a positive public policy directed toward providing more adequately for people in these dry areas. An inventory of the human resources as well as the type and amounts of water resources present is also necessary. A critical factor is what type of development system will be used to augment water supplies. Alternatives might include conventional storage and conveyance facilities, weather modification, sea or brackish water conversion, geothermal water production, increasing efficiencies of present systems of ground and surface water supplies, and transbasin water diversion. Trends indicate a rapidly increasing amount of malnutrition and hunger will prevail placing greater demands for world food production. Water development in arid areas is possible with present technologies, and consideration should be given to development of these areas to prevent migration to the already overburdened population centers and as a means of increasing world food supplies. (Mastic-Arizona)
W75-04603

ENGINEERING A VICTORY FOR THE ENVIRONMENT: A CITIZEN'S GUIDE TO THE U.S. ARMY CORPS OF ENGINEERS,
Institute for the Study of Health and Society, Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-04755

THE URBAN REGION PLAN: SAINT JOHN, (NEW BRUNSWICK), URBAN REGION IMPACT STUDY.
Proctor, Redfern, Bousfield and Bacon, Saint John (New Brunswick).
Draft copy. February, 1971. 288 p, 3 plates, 32 tab, 5 append.

Descriptors: *City planning, *Comprehensive planning, *Regional development, Governments, *Land uses, *Regional analysis, Future planning, *Canada, Cities, Urbanization, Education, Ecology, Highways.
Identifiers: Saint John, New Brunswick(Can), Kennebecasis River(Can), Saint John River(Can), Urban centers.

The first part of this report, The Region: Data Collection and Analysis, includes topographical and physiographical features, population trends, employment distribution, present land uses, wildlife, agricultural production, recreation areas, and regional service facilities. Examination of potential regional water supply sources concludes that the Kennebecasis and/or Saint John Rivers could provide a water supply for the ultimate needs of the area. Environmental quality of both water and air is analyzed. Municipal organization, finances, and transportation systems and changing life styles are discussed. Regional population projections indicate growth to 185,000 by 1987 for the Saint John Metropolitan Area. The Urban Region Plan (Part II) develops a concept to permit orderly growth, economic and efficient provision of facilities and services, and the least disruption of the regional ecology and rural economy. Principles incorporated are: concentration of urban uses in selected locations, linking centers with a network of high speed roads; and maintenance of a balance with the environment. Existing situations, requirements and recommendations are presented for urban centers, open space network, water and sewerage systems, highway systems and education. (Salzman-North Carolina)
W75-04756

PLANNING FOR WATER QUALITY IN THE BEAR RIVER SYSTEM IN THE STATE OF UTAH.
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 5G.
W75-04757

COMPREHENSIVE PLAN FOR WATER, SEWER AND STORM DRAINAGE IN THE LOWER RIO GRANDE VALLEY, (VOLUME II).
Nelson (B.L.) and Associates, Inc., Dallas, Tex.
For primary bibliographic entry see Field 5D.
W75-04759

A COMPENDIUM OF INFORMATION, (THE METROPOLITAN TORONTO AND REGION CONSERVATION AUTHORITY).
Metropolitan Toronto and Region Conservation Authority, Woodbridge (Ontario).
For primary bibliographic entry see Field 3D.
W75-04760

ARE WE READY FOR A CLOSED SYSTEM OF WATER SUPPLY, TREATMENT, AND REUSE - TECHNOLOGY VS. PSYCHOLOGY,
Water Resources Bulletin, Vol 10, No 5, p 942-951, October, 1974. 4 tab, 6 ref.
For primary bibliographic entry see Field 5D.
W75-04761

LIVING CITY, (MELBOURNE, AUSTRALIA, REVIEW OF OPERATIONS, 1972-73).
Melbourne and Metropolitan Board of Works, (Australia).
For primary bibliographic entry see Field 3D.
W75-04762

WATER-DISTRIBUTION RESEARCH AND APPLIED DEVELOPMENT NEEDS.
American Water Works Association, New York, Research Committee on Distribution Systems.
Journal of the American Water Works Association, Vol 66, No 6, p 385-390, June, 1974. 45 ref.

Descriptors: *Research priorities, *Water distribution(Applied), *Distribution systems, *Management, *Water delivery, Consumptive use, Distribution, Distribution patterns, Natural resources, Pipelines, Supply, Utilities, Water control, Water costs, Water demand, Water storage, Water supply, Technology, Systems analysis, Design data, Design standards, Design criteria, Research and development, Planning, Project planning.
Identifiers: Automatic operational control, Network properties, System stress reduction.

It is difficult to justify investment in research and development to simply satisfy intellectual curiosity, so criteria should include an expectation of high cost-effectiveness and potential for widespread application of results. To establish a background for the research and applied development needs to be cited, basic procedures in planning, analysis, design and in automatic operational control are presented. Two broad programs were identified that probably would yield the greatest return on investment: (1) network properties and data requirements, and (2) system stress reduction. Effects of design expedients employed for simulation to approximate observed field conditions should be evaluated. Possibilities should be investigated for attenuating peak loads so that distribution-system component size could be reduced, thereby prolinging the life of existing facilities. Distribution planning is not the only realm in which attention is at a disparate scale to investment, but investment in distribution facilities represents over half of total water-utility costs. Other needs identified include: the role of water service in reviving declining communities, planning emergency service, hypothetical alternative designs of water services, determination of kinds and amounts of data needed for modeling, development of methods for system analysis, and development of methods for optimal operation of existing systems. (Grden-North Carolina)
W75-04763

COMPREHENSIVE WATER AND SEWER PLAN FOR ALAMANCE COUNTY, NORTH CAROLINA,
Freeman (William F.) Associates, High Point, N.C.
For primary bibliographic entry see Field 5D.
W75-04765

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

DIFFERENCES BETWEEN PLANNED AND ACTUAL COSTS AND BENEFITS IN SMALL WATERSHED DEVELOPMENT,
Economic Research Service, East Lansing, Mich. Natural Resource Economics Div.
For primary bibliographic entry see Field 4D.
W75-04433

AN ECONOMIC ANALYSIS OF AGRICULTURAL LAND USE PRACTICES TO CONTROL WATER QUALITY,
Cornell Univ., Ithaca, N. Y.
For primary bibliographic entry see Field 5G.
W75-04526

ENFORCEMENT ECONOMICS IN AIR POLLUTION CONTROL,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Economics.
For primary bibliographic entry see Field 5G.
W75-04569

AN EVALUATION OF MARKETABLE EFFLUENT PERMIT SYSTEMS,
Meta Systems, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5G.
W75-04571

ECONOMIC DISINCENTIVES FOR POLLUTION CONTROL: LEGAL, POLITICAL, AND ADMINISTRATIVE DISINCENTIVES,
Environmental Law Inst., Washington, D. C.
For primary bibliographic entry see Field 5G.
W75-04576

AN ASSESSMENT OF WET SYSTEMS FOR RESIDENTIAL REFUSE COLLECTION: SUMMARY REPORT,
Curran Associates, Inc., Northampton, Mass.
For primary bibliographic entry see Field 5D.
W75-04577

REGULATION OF GREAT LAKES WATER LEVELS--APPENDIX E--COMMERCIAL NAVIGATION,
International Joint Commission-United States and Canada. Great Lakes Levels Board.
For primary bibliographic entry see Field 2H.
W75-04601

TV INSPECTIONS SLASH SEWER COSTS $300 PER REPAIR,
St. Louis Metropolitan Sewer District, Mo.
For primary bibliographic entry see Field 5G.
W75-04830

ECONOMICS, (LITERATURE REVIEW),
Georgia Inst. of Tech., Atlanta, Ga. Envrionmental Resources Center.
For primary bibliographic entry see Field 5G.
W75-04846

6D. Water Demand

WATER: CANADIAN NEEDS AND RESOURCES,
For primary bibliographic entry see Field 6B.
W75-04359

THE BRANDYWINE: FIVE YEARS AFTER,
Pennsylvania Univ., Philadelphia. Inst. for Environmental Studies.
For primary bibliographic entry see Field 6B.
W75-04360

MORE WATER FOR ARID LANDS, PROMISING TECHNOLOGIES AND RESEARCH OPPORTUNITIES.
Ad Hoc panel of the Advisory Committee on Technology Innovation, Board on Science and Technology for International Development, Commission on International Relations.
For primary bibliographic entry see Field 3B.
W75-04508

A REGIONAL MODEL OF THE FUTURE DEMAND FOR TRANSPORTATION: THE CASE OF BARGE TRANSPORTATION,
Institute for Water Resources (Army), Alexandria, Va.
For primary bibliographic entry see Field 6A.
W75-04520

DEMAND FOR IRRIGATION: A CASE STUDY OF GOVERNMENT TUBE-WELLS IN UTTAR PRADESH,
Institute of Economic Growth, Delhi (India).
B. D. Dhawan.
Indian Journal of Agricultural Economics, Vol 28, No 2, p 59-67, April-June 1973. 4 tab, 1 ref.

Descriptors: *Water demand, *Irrigation water, *Elasticity of demand, *Linear programming, Governments, Least squares method, Water policy, Prices, Rainfall, Hydrologic data, Agriculture, Estimating, Equations, Mathematical models, Systems analysis, Time series analysis.
Identifiers: *Tube-wells, *India(Uttar Pradesh), *Multiple regression analysis, Crop pattern, Time series data.

Presented are some estimates of elasticity of demand for irrigation water with respect to four variables: (1) price of farm output; (2) price of irrigation water; (3) normal rainfall; and (4) deviation from normal rainfall. A single-eq(uation linear multiple regression model applied to the time series data in respect of State tube-wells in Uttar Pradesh is described. The model is estimated by the least squares method; the estimates suffer from the single-equation bias of an unknown magnitude. This study provides a basis for important policy implications: (1) The level of tube-well utilization is more sensitive to agricultural prices than to the prices of tube-well water: (2) irrigation water is seriously under-priced in India, with the Government incurring substantial losses in running the irrigation projects, and State tube-wells are no exception in this regard; (3) irrigation rates in relatively high rainfall areas must be relatively high for efficient utilization of the irrigation potential; and (4) the elastic relation between deviation from normal rainfall and demand for irrigation water suggests that large annual fluctuations in revenue receipts of a project can be dampened only be introducing an element of fixity in water rates: the introduction of a two-part tariff for tube-well water is a step in the right direction. (Bell-Cornell)
W75-04529

APPLICATION OF THE MAIN II WATER FORECASTING SYSTEM TO WYOMING COMMUNITIES,
Wyoming Univ., Laramie.
D. A. Quan.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 411, $4.25 in paper copy, $2.25 in microfiche. MSc Thesis, December 1973. 50 p, 20 tab, 28 ref, append. OWRT B-009-WYO(1).

Descriptors: *Wyoming, *Forecasting, *Water demand, *Water requirements, *Estimating, *Computer programs, Data collections, Computer models, Statistics, Municipal water, Water utilization, Sprinkling, Mathematical models, Systems analysis.
Identifiers: Sensitivity.

Reported is a project which tested the applicability of the MAIN II (Municipal and Industrial Needs) Water Forecasting System to five Wyoming, fairly typical western, communities: Cheyenne, Casper, Glenrock, Rock Springs, and Green River. MAIN II is a complex computer program that applies a number of equations to forecasting water demands and a library of water usage coefficients; for estimating water requirements, it employs mathematical models, unit use coefficients, and per capita coefficients. Errors found in the MAIN II program were corrected, and the program was modified to fit the existing data. Certain kinds of data were difficult to obtain for the five communities. Using a base year, forecasts were made and compared with actual water demands. Three optional MAIN II projection methods were tested: internal growth modeling, historical extrapolation of data, and external projection. Results showed the latter two methods to be fairly reliable. The internal growth models were not representative of Wyoming cities due to the atypical growth patterns of Wyoming communities as compared to those of the nation as a whole. Wyoming communities obtain their new water supplies from groundwater sources or by purchasing agricultural surface water rights from streams. The incremental cost for new water is considerable, and financially, therefore, it is vital to the community to be able to forecast water demands in advance of the needs as accurately as possible. (Bell-Cornell)
W75-04541

THE URBAN REGION PLAN: SAINT JOHN, (NEW BRUNSWICK), URBAN REGION IMPACT STUDY.
Proctor, Redfern, Bousfield and Bacon, Saint John (New Brunswick).
For primary bibliographic entry see Field 6B.
W75-04756

ARE WE READY FOR A CLOSED SYSTEM OF WATER SUPPLY, TREATMENT, AND REUSE - TECHNOLOGY VS. PSYCHOLOGY,
Water Resources Bulletin, Vol 10, No 5, p 942-951, October, 1974. 4 tab, 6 ref.
For primary bibliographic entry see Field 5D.
W75-04761

WATER-DISTRIBUTION RESEARCH AND APPLIED DEVELOPMENT NEEDS.
American Water Works Association, New York, Research Committee on Distribution Systems.
For primary bibliographic entry see Field 6B.
W75-04763

THE DESIGN AND PROMOTION OF A SCHEME USING MIXED WATER FROM THE RIVERS ANCHOLME, WITHAM AND TRENT FOR INDUSTRIAL SUPPLY TO HUMBERSIDE,
Rofe, Kennard and Lapworth, London(England).
For primary bibliographic entry see Field 3E.
W75-04764

6E. Water Law and Institutions

DELAWARE RIVER BASIN COMPACT: A REVIEW WITH RESPECT TO ENVIRONMENTAL QUALITY,
Pennsylvania Univ., Philadelphia. Inst. for Environmental Studies.
A. L. Strong, J. C. Keene, J. Hillsberg, F. Uthman, and M. Aspin.
April 1, 1971. 95 p, 3 fig, 4 tab, 120 ref.

Descriptors: *Water management(Applied), *Delaware River Basin Commission, *Interstate commissions, *River basin commissions, Water resources, *Delaware River, *Wetlands, Water pollution, Abatement, Delaware, Maryland, New York, New Jersey, Riverbasins, Water pollution treatment, Water pollution sources, Water pollution effects, Water policy, Water supply, Water quality standards, Water resources development, Reviews, Comprehensive planning, Management, Aquatic environment, Marshes, Flood plains.
Identifiers: *Delaware River Basin Compact, Regulatory power, Wetlands protection, Acquisition power.

An assessment of the Delaware River Basin Commission's (DRBC) progress and determination of its long-range needs is presented, including a discussion of its environmental enhancement and protection adequacy, power to abate and control pollution, methods to fund programs, and adequacy of enforcing powers. In the Delaware River basin, the existence and functioning of flood plains, marshes, and other wetlands are threatened by development, either directly or consequentially. No technique has yet been prefected to compare the value of water resource functions of the wetlands with the value of development that conflicts with these functions. This measuring technique is urgently needed. Meanwhile, the importance of these areas is established and warrants rapid, stringent action for their protection. DRBC has adequate planning and acquisition powers to protect the wetlands, but money for acquisition is not yet available. Ahigh priority is placed on protection of the water resource functions of the wetlands. Other suggestions for new DRBC involvement include planning, project review, indirect and direct regulation, stimulating action by other units of government, and various forms of purchase. However, the nature of the Commission depends on action by the federal government and the four states of New York, New Jersey, Pennsylvania and Delaware. (Grden-North Carolina)
W75-04361

REGULATION OF URBAN DEVELOPMENT TO CONTROL RUNOFF AND EROSION,
Pennsylvania Univ., Philadelphia. Inst. for Environmental Studies.
For primary bibliographic entry see Field 4D.
W75-04362

COMPLYING WITH DISCHARGE REGULATIONS,
Environmental Protection Agency, Washington, D. C.
For primary bibliographic entry see Field 5G.
W75-04431

AN EVALUATION OF STATE LAND USE PLANNING AND DEVELOPMENT CONTROL IN THE ADIRONDACKS,
Cornell Univ., Ithaca, N.Y. Dept. of Natural Resources.
M. K. Heiman.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB 239 403, $3.75 paper copy, $2.25 microfiche. Cornell University Water Resources and Marine Sciences Center, Ithaca, Technical Report No 93, 22 p, 3 tab, 2 fig, appendx. OWRT A-049-NY (2), 14-31-0001-4032.

Descriptors: *Land use, *Planning, *Regional development, *Local governments, *Land development, *Parks, State governments, Administration, Evaluation, Constraints, Land resoures, Rural areas, Resource allocation, Human population, *New York.
Identifiers: *Adirondacks(N.Y.), Adirondack Park Agency(N.Y.), *Administrative agencies, *State policies, Compliance theory, Local compliance, Towns.

A regional resource planning and regulatory agency must be able to recognize the significance of local involvement to its survival and performance. The organizational theory and compliance nomenclature presented by Amitui Etzioni ('A Comparative Analysis of Complex Organizations' 1961) offers the agency a useful means by which to conceptualize its relationship with local governments, determine resource allocation schemes and assess its own performance. Recognition by an agency of the variation in local response to its programs and policies and of the variables predicting the nature of local involvement, would enable it to modify its involvement with local governments in a manner encouraging that compliance structure most amenable to agency goal attainment. Since State interest had historically been firmly established in the Adirondacks, thus paving the way for intervention, the policy issues associated with State-level land use control efforts have tended to emerge earlier in this region than elsewhere. Examining New York State's effort to institute land use regulations in the Adirondacks, those specific variables predicting the nature of town compliance were delineated. Agency performance was evaluated and potential constraints on long-range success were discussed.

W75-04445

AN IN-DEPTH LOOK AT FEDERAL POLLUTION CONTROLS,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 5G.
W75-04544

AN OPERATIONAL FRAMEWORK FOR COASTAL ZONE MANAGEMENT PLANNING.
Meta Systems, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 6A.
W75-04558

AN EVALUATION OF MARKETABLE EFFLUENT PERMIT SYSTEMS,
Meta Systems, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 5G.
W75-04571

USED OIL LAW IN THE UNITED STATES AND EUROPE,
Environmental Law Inst., Washington, D. C.
For primary bibliographic entry see Field 5G.
W75-04575

RAILROAD AND CANAL COMPANIES--EMINENT DOMAIN (AS AMENDED),
Florida Sess. Laws, Vol 1, Ch. 74-47, p 44-45, approved May 17, 1974, effective immediately (1974). 2 p.

Descriptors: *Railroads, *Canals, *Eminent domain, *Condemnation, Legal aspects, Economics, Bridges, Lakes, Streams, Rivers, Gulfs, Oceans, *Florida, Legislation, Governments, Land use, Natural resources, Water law, Water resources development, Commerce, Compensation, Water management(Applied), Land management, Adoption of practices.
Identifiers: State policy, *Inverse condemnation.

This act relates to the special powers granted by the Florida legislature to railroad and canal companies. Any railroad or canal company which is or may become public carrier may condemn land surrounding any extension or terminal facility on any of the waters of any lake, river, bay, gulf or ocean. This condemned land may be used for depots, yards, switches, turntables, shops and storehouses. The carriers also have been granted the power to condemn any area in and over the waters for use as docks, wharves, elevators, ware or store houses, and all required facilities for the reception, retention, transfer, and forwarding of commerce. All enumerated rights shall be subordinate to the right of the governmental entity wherein the property is located to condemn said property through the exercise of its powers of eminent domain for a public purpose. (Proctor-Florida)
W75-04580

ENVIRONMENTAL LAND AND WATER MANAGEMENT ACT--AMENDMENTS,
For primary bibliographic entry see Field 5G.
W75-04581

COASTAL MAPPING ACT,
Florida Sess. Laws, Vol 1, Ch. 74-56, p 56-61, approved May 20, 1974, effective July 1, 1974. 6 p.

Descriptors: *Maps, *Florida, *Legislation, Recreation, Navigation, Administration, Administrative agencies, Planning, State governments, Boundaries(Property), Land tenure, Standards, Adoption of practices, Measurement, Monitoring, Legal aspects, Water law, Water policy, Public lands.
Identifiers: *Coastal zone, *Mean high water line, State policy, Coastal zone management.

Accurate maps of coastal areas are required for many public purposes, including but not limited to the promotion of marine navigation, the enhancement of recreation, the determination of coastal boundaries, and the implementation of coastal zone planning and management programs by state and local governmental agencies. The Legislature recognized the desirability of the confirmation of the mean high water line as the boundary between Florida state sovereignty land and uplands subject to private ownership. Uniform standards and procedures need to be developed with respect to the establishment of local tidal datums and the determination of the mean high-water and mean low-water lines. The powers and duties of the Florida Department of Natural Resources are spelled out including the responsibility of providing a comprehensive and continuous program of coastal boundary mapping which will permit accurate surveys. Upon the completion of a map or series of maps, a copy of the map is transmitted to the circuit court. Before a map becomes effective, the department is to hold a public hearing in the county where the land is located. (Sperling-Florida)
W75-04582

COASTAL RESOURCES MANAGEMENT AND CONSERVATION REPORT PUBLISHED,
For primary bibliographic entry see Field 2L.
W75-04583

WATER QUALITY MANAGEMENT BASIN PLANS REGULATIONS ADOPTED,
For primary bibliographic entry see Field 5G.
W75-04584

EPA EFFORTS TO END FEEDLOT MANURE POLLUTION CRITICIZED,
For primary bibliographic entry see Field 5G.
W75-04585

EPA TO ISSUE IMPACT STATEMENTS ON SOME REGULATORY ACTIONS,
For primary bibliographic entry see Field 5G.
W75-04586

PERMIT PROVISIONS ADOPTED FOR OCEAN WATER ACTIVITY,
For primary bibliographic entry see Field 5G.
W75-04587

ZAHN, ET AL. V. INTERNATIONAL PAPER CO. (CLASS ACTION SEEKING DAMAGES FROM DISCHARGES),
1 Pollution Control Guide, Vol 3, paragraph 15025, p 15223-15232, 1974. 10 p.

Descriptors: *Judicial decisions, *Adoption of practices, *Legal aspects, *Jurisdiction, *Adjudication procedure, Water pollution, Lakes, United States, Federal government, Economic aspects, Water pollution sources, Water law, Legislation, Water quality control, Legal review, Federal jurisdiction, *New York, *Vermont.
Identifiers: Standing(Legal), Class action suits.

A class action suit was brought by owners and renters of Vermont property on Lake Champlain against a New York State pulpmill for having discharged wastes from its plant which polluted the lake. Damages were alleged based upon the depreciation of the value and the decrease of utility of plaintiffs' properties. The United States Supreme Court held that the failure of the unnamed class members to satisfy the minimum jurisdictional amount requirement for suits in the federal courts requires dismissal of the class action as to those persons. Even though the named plaintiffs satisfied the jurisdictional amount, $10,000, if the court concludes it is not feasible to define a class of property owners each of whom had such a claim, the Court may properly refuse to permit the suit to proceed as a class action. Aggregation of claims to satisfy the jurisdictional amount is not permitted. Any plaintiff who fails to satisfy the jurisdictional amount must be dismissed from the case, even though other individuals allege jurisdictionally sufficient claims. (Sperling-Florida)
W75-04588

PROPOSED 1973 OUTER CONTINENTAL SHELF OIL AND GAS GENERAL LEASE SALE OFFSHORE MISSISSIPPI, ALABAMA, AND FLORIDA, VOLUME 4, (FINAL ENVIRONMENTAL STATEMENT),
Bureau of Land Management, Washington, D. C.
For primary bibliographic entry see Field 5G.
W75-04589

PROPOSED 1973 OUTER CONTINENTAL SHELF OIL AND GAS GENERAL LEASE SALE, OFFSHORE MISSISSIPPI, ALABAMA, AND FLORIDA, VOLUME 5, (FINAL ENVIRONMENTAL STATEMENT),
Bureau of Land Management, Washington, D. C.
For primary bibliographic entry see Field 5G.
W75-04590

MONTGOMERY ENVIRONMENTAL COALITION, ET AL. V. FRI, ET AL. (SEEKING DECLARATORY RELIEF FROM FURTHER SEWER HOOKUPS ON POTOMAC).
For primary bibliographic entry see Field 5G.
W75-04591

EPA POLICY ON INJECTION WELLS.
For primary bibliographic entry see Field 5G.
W75-04592

E.P.A. POLICY TO PROTECT THE NATION'S WETLANDS.
For primary bibliographic entry see Field 5G.
W75-04593

WATER QUALITY STANDARDS: THE FEDERAL PERSPECTIVE--PROGRESS TOWARD OBJECTIVES,
For primary bibliographic entry see Field 5G.
W75-04595

WATER QUALITY CONTROL--THE ROLE OF THE INTERSTATE AGENCY,
Delaware River Basin Commission, Trenton, N.J.
For primary bibliographic entry see Field 5G.
W75-04596

AMENDING THE ACT OF JULY 4, 1955, AS AMENDED, RELATING TO THE CONSTRUCTION OF IRRIGATION DISTRIBUTION SYSTEMS.
Committee on Interior and Insular Affairs (U.S. Senate).
Senate Report No. 1244, 92nd Cong, 2d Sess. (1972).

Descriptors: *Irrigation, *Water distribution(Applied), *Legislation, *Drainage systems, *Government finance, Construction, Water supply, Legal aspects, Water reuse, Distribution systems, Federal government, Irrigation systems, Water conveyance, Water utilization, Water law, Administrative agencies, Administration.
Identifiers: Administrative regulations, *Congressional hearings.

The purpose of a bill relating to the construction of irrigation distribution systems is to amend the existing reclamation distribution system loan program. The amendment will bring irrigation drainage works and municipal and industrial water

supply works within the existing program. Also, the requirement for the transfer of title of lands to the United States for the duration of the loan has been deleted. The Distributions Systems Loan Act was enacted originally to provide a reclamation project, that has been authorized for construction by the Bureau of Reclamation, the local irrigation district, or other non-federal public entity, with a federal loan to construct the facility. In the seventeen years this program has been operating, eleven loans totalling seventy-four million dollars have been made. The committee unanimously endorses enactment of this bill. (Sperling-Florida)
W75-04597

AQUATIC PLANT CONTROL.
Florida Sess. Laws, Vol 1, Ch 74-65, p 69-71, approved May 23, 1974, effective July 1, 1974. (1974) 3 p.

Descriptors: *Legislation, *Florida, *Aquatic weed control, *Aquatic life, Submerged plants, Natural resources, Water supply, Water resources, Water resources development, Federal agencies, Jurisdiction, Governments, Water law, Water pollution, Water pollution sources, Governmental interrelations, Administrative agencies, Weed control, Aquatic weeds, Biocontrol, Water quality control.
Identifiers: *State policy, Environmental policy.

This Act broadens the authority of the Florida Department of Natural Resources in controlling non-indigenous aquatic plants in the state. State participation on a matching basis with local agencies in funding non-indigenous aquatic plant maintenance programs is encouraged. The Act provides for annual reporting and fiscal accounting. The Department of Natural Resources is authorized to cooperate with the federal government in programs to control the growth of non-indigenous aquatic plants and other noxious aquatic plants. Cooperation between the Department of Natural Resources and the Game and Fresh Water Fish Commission in carrying out various plant control and maintenance functions is permitted. Included in the Act are definitions and a section relating to legislative intent. (Sperling-Florida)
W75-04599

FLOOD DISASTER PROTECTION ACT OF 1973.
For primary bibliographic entry see Field 6F.
W75-04600

EFFECT OF FEEDLOT LAWS AND CLIMATE ON OPEN FEEDLOT WASTE MANAGEMENT,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W75-04630

EPA PREPARING TO 'RAILROAD' THROUGH NEW POLLUTION RULES COVERING CATTLE FEEDLOTS,
For primary bibliographic entry see Field 5G.
W75-04639

A BRIEF HISTORICAL SURVEY OF FREEDOM OF THE SEAS,
P. Dees.
In: Sea Grant Publication UNC-SG-73-01, p 1-17, March, 1973. 88 ref.

Descriptors: *International law, *Law of the Sea, *International waters, *Foreign trade, *Oceans, Continental shelf, Geology, Navigation, Continental slope, Civil law, Common law, Jurisdiction, Governments, Treaties, Foreign waters, Resources development, Ships.
Identifiers: *Coastal zone management, International agreements, Territorial seas(Jurisdiction), Territorial waters.

From ancient times freedom of the seas has been enforced to maintain unrestricted commercial intercourse. The first maritime codes were the Hellenic Mare Clausum, the Rodian Sea Law adopted by the Romans in 51 B.C. and the Byzantine emperor Justinian's maritime provisions in Corpus Juris Civilis. With the advent of the Age of Discovery Most maritime nations were claiming sovereignty over parts of the open seas. Some influential persons, including Queen Elizabeth I and the Dutch legal scholar Grotius, protested this threat to international maritime freedom. Grotius is the acknowledged 'Father of International Law' for his work Mare Liberum. Although his ideal of freedom of the open sea was heatedly contested, steady progress was made toward that ideal and it was universally recognized by the beginning of the nineteenth century. It has evolved that the open seas are the territory of no state and therefore not subject to any state's legislation, administration, jurisdiction or police over parts of the open sea. The foundation of this doctrine is based on one of two mutually exclusive legal theories: first, the sea belongs to no one (res nullis) or second, the sea belongs to everyone (res communis). (Dillingham-Florida)
W75-04648

CRISIS IN THE SOUTH PACIFIC: TUNABOAT SEIZURES,
J. W. Abel.
In: Sea Grant Publication, UNC-SG-73-01, p 18-28, March 1973. 47 ref.

Descriptors: *International law, *International commissions, *Commercial fishing, *Treaties, *International waters, Law of the sea, Foreign trade, Governmental interrelations, Foreign waters, Fishing, Trespass, Water law, Penalties(Legal), Navigation, Oceans, Boundary disputes, Jurisdiction, Governments, Ships.
Identifiers: *Territorial seas(Jurisdiction), International agreements, *Territorial waters.

An area of major contention in international law is the breadth of a coastal nation's territorial waters. All attempts at codification of a generally accepted breadth of the territorial sea have failed. Thus claims range from a two-hundred mile to a three-mile limit. Chile, Ecuador, Peru and eight other Latin American (C-E-P) states have claimed a two-hundred mile territorial sea. This provoked the Truman Proclamations (1945) that sea and seabed resources contiguous to the United States might be subject to U.S. jurisdiction. C-E-P argues that the historical trend, economic self-preservation, and lack of established principles backup their claim of a 200-mile limit. The United States asserts these claims violate international conventions and established principles. The C-E-P states from 1961 to 1971 have seized 145 tuna vessels. This has resulted in great losses for the U.S. fishing industry, which is entitled by the Fisherman's Protective Act (FPA) to enter the territorial waters of another sovereign if in pursuit of tuna. The FPA contains provisions for the use of sanctions against foreign nations seizing U.S. vessels. (Dillingham-Florida)
W75-04649

JURISDICTION IN NATIONAL WATERS,
L. Allison.
In: Sea Grant Publication, UNC-SG-73-01, p 29-42, March, 1973. 104 ref.

Descriptors: *Jurisdiction, *International law, *Law of the sea, *Treaties, *Internal water, Foreign waters, International waters, Tariff, Water law, Public health, Sanitation, Ships, Harbors, Navigation, Straits, Inland waterways, Governmental interrelations, Oceans, Trespass, Penalties(Legal), Regulation, Foreign trade, Law enforcement.
Identifiers: *International agreements, *Territorial waters, Territorial seas(Jurisdiction).

There is a large body of laws concerning a coastal state's jurisdiction over foreign ships in its internal and territorial waters. Commercial ports are open to foreign ships though military bases are not. The 1958 Geneva Convention provided that internal waters are subject to the particular laws of the coastal state. For unlawful acts concerning only the internal order the coastal state of the ship may yield its jurisdiction to that of the ship's flag state. In a maritime claims case a municipal court has the power to detain a foreign merchant ship and attach it as security for the claim. Navigation and navigational aides to ships are under the control of the coastal state. A coastal nation exercises absolute police, customs regulation and revenue collection powers in its territorial waters, subject only to the right of innocent passage. Certain countries, the U.S.S.R. and the Peoples Republic of China included, generally follow these guidelines but occasionally overstep them. Other nations use their control of their territorial waters as an extension of foreign policy to sanction another nation by denying the other's vessels even innocent passage. The Arab States deny Israel access to the Straits of Tiran and Canada wishes to deny U.S. oil tankers passage to the North American Archipelago for fear of oil spills. (Dillingham-Florida)
W75-04650

AUTHORIZATION FOR SECRETARY OF INTERIOR TO ACQUIRE ADDITIONAL WETLANDS.
Committee on Merchant Marine and Fisheries (U.S. House).
H.R. Report No. 9823, 93d Cong, 1st Sess (1973).

Descriptors: *Federal government, *Legislation, *Government finance, *Adoption of practices, *Wetlands, Wildlife conservation, Administrative agencies, Administration, Economics, Inter-agency cooperation, Planning, Aquatic habitats, Land ownership, Land use, Right-of-way, Ecology, Water law, Water policy, Water management(Applied).
Identifiers: *Administrative regulations, *Congressional hearings.

The bill authorizes the Secretary of the Interior to issue certain obligations and to utilize the revenues to acquire additional wetlands. The wetlands to be acquired include additional waterfowl nesting and breeding grounds. The Secretary of the Interior is authorized to issue, and have outstanding, obligations which mature in less than ten years. The obligation shall bear such rate or rates of interest as determined by the Secretary of the Interior and approved by the Secretary of the Treasury. These obligations may be redeemable at the option of the Secretary of the Interior before maturity. The Secretary is also authorized to purchase any outstanding obligations under this section at any time and at any price. All obligations issued by the Secretary pursuant to this act are to be deemed exempt securities within the meaning of laws administered by the Securities and Exchange Commission. (Sperling-Florida)
W75-04651

A BILL TO ASSURE SAFE DRINKING WATER.
H.R. Rep. No. 5368, 93d Cong, 1st Sess. 1974. 20 p.

Descriptors: *Water purification, *Federal government, *Inter-agency cooperation, *Legislation, *Potable water, Water quality standards, Law enforcement, Penalties(Legal), Civil law, Federal jurisdiction, Regulation, Water quality, Water utilization, Water pollution, Water policy, Public health, Water distribution(Policy), Administrative agencies, Domestic water, Consumptive use, Water distribution(Applied), Water management(Applied), Adoption of practices, Water quality control.
Identifiers: *Administrative regulations.

This bill proposes to ensure safe drinking water by establishing standards of drinking water quality

and by providing for adequate treatment, surveillance and maintenance of water treatment and distribution facilities. The Environmental Protection Agency shall establish primary standards to protect public health and secondary standards to assure esthetically appealing drinking water. The states shall be responsible for enforcing the standards. Willful violation and conviction will result in either one year imprisonment or a $15,000 fine or both per violation. Non-willful violation will be liable in a civil suit for not more than $10,000 per violation. Private citizens may commence a civil action against any government agency for violation of the standards or for failure to perform any duty required by the Act. The Act provides for the EPA to conduct research studies, and to render financial and technical assistance to appropriate public and private agencies conducting studies related to drinking water quality and its effects. (Dillingham-Florida)
W75-04652

A COMPENDIUM OF INFORMATION, (THE METROPOLITAN TORONTO AND REGION CONSERVATION AUTHORITY).
Metropolitan Toronto and Region Conservation Authority, Woodbridge (Ontario).
For primary bibliographic entry see Field 3D.
W75-04760

THE BLOCKADE 'EXCEPTION' TO TERRITORIAL WATER JURISDICTION,
D. M. Martin.
In: Sea Grant Publication UNC-SG-73-01, p 43-50, March 1973. 42 ref.

Descriptors: *Law of the sea, *Foregin trade, *International law, *Governmental interrelations, Common law, Legal aspects, Water law, Political aspects, Jurisdiction, Governments, Navigation, Oceans, Foreign waters, Export, Import, Federal government, Foreign countries, Water policy, International waters.
Identifiers: *Territorial seas(Jurisdiction), Coastal waters.

The international law of naval blockade is a curious exception to the basic notions of national sovereignty over territorial seas, in that it permits the preemption of the adjacent state's right of jurisdiction. Considered are the historical development of the naval blockade, its place within the common law, its use as an instrument of warfare and diplomacy, and its relevance to modern international law. The traditional common law doctrine of blockade has lost most of its relevance and has been subsumed within international law. The two most recent applications of the blockade by the United States, the blockade of Cuba in 1962, and the 1972 blockade of North Vietnam, are used to illustrate the evolution of the blockade from a simple military tactic to an instrument of diplomatic expression. Modern technology has made it virtually impossible to maintain an effective shore blockade and still comply with internation law. Modern blockades depend on having enough military power to disregard the rule of law. Blockades of the future will follow the style of the Cuban and Vietnamese blockades. (Deckert-Florida)
W75-04766

THE INTERNATIONAL SEABED REGIME: PROPOSALS AND PROSPECTS FOR REALIZATION,
A. M. Neal, Jr.
In: Sea Grant Publication, UNC-SG-73-01, p 75-81, March 1973. 58 ref.

Descriptors: *Beds under water, *Oceans, *Ownership of beds, Jurisdiction, Water law, Geology, Submerged lands, International law, United Nations, Regime, Bottom sediments, Mining, Mineral industry, Mining engineering, International water, Governmental interrelations, Adoption of practices, Regulation, Enforcement.
Identifiers: *Seabed mining, *International agreements.

The prospective development of an international seabed regime to regulate international use of the ocean floor is discussed. The regime is chiefly concerned with the commercial aspects of seabed development, mining being of foremost interest. Due to the new developing capital technology and the bugeoning population, the earth's natural resources are being depleted, and man must look for new sources of raw materials. Because interest in the deep seabeds as a source of raw materials is increasing, there has emerged a great need for the establishment of applicable law. In 1968 the United Nations declared that seabed exploitation should be carried out for the benefit of mankind. The General Assembly has more recently buttressed this stand by refusing to honor national ownership of seabed areas, and terming it an international area. In 1974, a Law of the Sea Conference is to be convened to establish international machinery for seabed regulation. All countries taking part agree that in general mankind should benefit. The Conference, however, may be cancelled for a general lack of preparation. Problems with reference to seabed development are great. Questions exist as to the relation of the international seabed and the respective authority of related agencies comprising the seabed regime. (Sperling-Florida)
W75-04767

THE MARINE ENVIRONMENT AND TOXIC SUBSTANCES (WHEN WAS THE LAST TIME YOU HAD A GOOD SWORDFISH STEAK),
B. W. Pittman.
In: Sea Grant Publication, UNC-SG-73-01, p 82-97, March 1973. 67 ref.

Descriptors: *Water pollution, *Oceans, *International law, *Legal aspects, *Adoption of practices, Water law, Oil pollution, Heavy metals, Pesticides, Ecology, Environmental effects, Jurisdiction, Government, Water resources, Biota, Water pollution sources, Water quality, Water quality control, Marine fisheries, Evaluation, Pollution abatement.
Identifiers: International agreements, *Territorial waters, Territorial seas(Jurisdiction).

Man knows little about the ocean's vital resources, and he creates serious problems of marine pollution, particularly with respect to the impact of toxic substances on the marine biota. The problem of marine pollution is both national and international in scope. Most of the pollution of prime marine habitat is caused by land-based activities such as industrial and domestic waste disposal. Effects, however, are not local. Ocean currents and atmospheric conditions tend to cause pollution created by one nation to invade the territorial waters of other nations. Oil, heavy metals, and chlorinated hydrocarbons are the principal sources of pollution. Other sources include dumping, shipping and man's exploitation of marine resources. These pollutants have both short and long term adverse effects. The building of an applicable legal system for protecting the sea may be started by national legislation. Each nation must assume the responsibility of enforcing pollution regulations within its territorial waters. Unilateral action alone will not suffice. International solutions must be found. Several international organizations have been created to research the marine problem. Longterm solutions must include public education, a redirection of world thinking and a study of the population explosion. (Sperling-Florida)
W75-04768

THE DISPOSAL OF RADIOACTIVE WASTES INTO THE SEA: SOME INTERNATIONAL LEGAL CONSIDERATIONS,
G. A. Planer.
In: Sea Grant Publication UNC-SG-73-01, p 98-107, March 1973. 26 ref, 2 append.

Descriptors: *Radioactive waste disposal, *Nuclear wastes, *Water pollution sources, Industrial wastes, Economics, Safety, Radioactivity techniques, International law, Environmental control, Population, Productivity, Environmental effects, Radioactivity effects, Environmental sanitation, Disposal, Waste disposal, Waste storage, Federal jurisdiction, Oceans, Lakes.
Identifiers: *International agreements, *Absolute liability, *Hazardous substances(Pollution).

The development and increasing use of nuclear energy for the generation of electric power, and the expanding applications or radioisotopes in research, industry and medicine, are unavoidably associated with the production of unwanted by-products in the form of complex mixtures of radioactive elements. These by-products, called fission products, present serious problems in terms of their safe disposal. The most important consideration in the treatment of such waste is preventing its return to the environment and injuring man either directly through contact or indirectly through contamination of the food and water supplies. The economic pressure to increase release of contaminants into the environment and to treat as little of the wastes as possible has to be countered by safety considerations which limit the quantity that can be released safely. Two main philosophies of waste disposing are in competition. The first is to concentrate and contain the gas, liquid, or solid waste in such a way that it is at all times under complete control. Harm to the environment or property resulting from release of radioactive contaminants might give rise to a theory of international absolute liability for noncomplying nations. A second suggestion is that regulations should be formulated establishing disposal limits for each site individually instead of enacting blanket regulations governing all disposal sites. Recommendations are made to insure the safe disposal of radioactive wastes into both fresh waters and the seas. (Sperling-Florida)
W75-04769

THE LAW OF MARITIME OIL SPILLS,
J. Pendergrass.
In: Sea Grant Publication, UNC-SG-73-01, p 108-118, March 1973. 30 ref.

Descriptors: *Oil pollution, *International law, *Oceans, *Pollution abatement, *Environmental effects, Pollution, Sea water, Oil industry, International waters, Oil wastes, Water pollution sources, Water law, Jurisdiction, Oil spills, United Nations, Water pollution control, Pollution control, Adoption of practices, Waste disposal, Federal government.
Identifiers: *Energy crisis, International agreements, Territorial seas(Jurisdiction).

The problem of oil pollution and its demand for an international solution are described. In the present state of world technology, oil is the principal source of energy. As a result of irregular distributions of oil deposits, massive shipping has been required to transport oil to industrial nations from relatively underdeveloped countries containing the richest deposits of oil. The world's oceans are deteriorating under the increasing strain of oil discharges. Considering the present state of oil pollution and energy needs, a legal solution must be developed. The United Nations' Inter-Governmental Maritime Consultative Organization prepared a treaty to permit governments to deal with oil pollution consequences and another treaty dealing with the question of civil liability for oil pollution damage. After discussion, the representatives of the Organization chose absolute liability with certain defenses as the scheme for establishing responsibility and the owner as the entity on whom such liability is placed. Jurisdiction on civil liability allows an action based on pollution damage to be brought in the courts of the contracting states where damage has been sustained or preventative measures taken. In 1972 the London Convention sought to limit waste dumping at sea. (Sperling-Florida)

W75-04770

AFRICAN ATTITUDES TOWARD THE LAW OF THE SEA,
P. Carruth, Jr.
In: Sea Grant Publication UNC-SG-73-01, p 166-177, March 1973. 35 ref.

Descriptors: *Continental shelf, *Water resources, *Law of the sea, *Boundaries(Property), *Water resources development, Oil industry, Water law, Legislation, Political aspects, Economic aspects, Minerals, Governments, International law, Conservation, Fishing, Social aspects, Legal aspects, Natural resources.
Identifiers: *International agreements.

Nations along the Gold Coast of Africa, such as Ghana, have taken extra measures to protect the wealth that might lie beneath the waters on the extended continental shelf. The Ghana Fishery Conservation Zone presently extends twelve miles off the coast and the territorial continental shelf is restricted to a hundred miles. However, a 1968 law established the territorial seabed at 100 fathoms with an extension to a depth capable of exploitation. Control of coastal oil reserves is one of the possibilities contemplated in this action. The Ivory Coast has analogous legislation. Kenya, Tanzania, and Liberia all have laws similar to other coastal states, those retaining the twelve mile limit. The Nigerians changed their limit in 1971 from twelve miles to thirty. Massive aid for development and offshore oil deposits are said to have prompted this action. The Nigerian government thinks that it will be able to enforce this boundary and that the country is able to develop this resources in some way economically beneficial to Nigeria. Sea laws that deal with other than local territorial issues are virtually non-existent. (Sperling-Florida)
W75-04771

BILL TO ESTABLISH THE POTOMAC NATIONAL RIVER IN THE STATES OF MARYLAND, VIRGINIA, WEST VIRGINIA, AND THE DISTRICT OF COLUMBIA AND FOR OTHER PURPOSES.
H. R. Rep. No 12785, 93d Cong, 2d Sess. (1974).

Descriptors: *Rivers, *Adoption of practices, *Federal government, *Aesthetics, *Administrative agencies, Administration, Regulation, Virginia, West Virginia, Maryland, Wildlife conservation, Land tenure, Condemnation, State governments, Decision-making, Legislation, Administrative decisions, Eminent domain, Land management, Water resources development.
Identifiers: Administrative regulations.

This is a bill to establish the Potomac National River in the states of Maryland, Virginia, West Virginia, and the District of Columbia. The river and the adjacent land area possess unusual natural, scenic, historic, fish and wildlife, and recreational values. To effectuate this act the Secretary of the Interior is authorized to acquire by donation, purchase or transfer from any other federal agency, land or property interests in the area. The boundaries of the national river shall not include more than fifty thousand acres. Property owned by any state or political subdivision thereof may be acquired only by donation. Federal property located within the boundaries may, with the concurrence of the head of the administrating agency, be tranferred to the administrative jurisdiction of the Secretary without a transfer of funds. The Secretary's authority to acquire property by condemnation within the national river shall be suspended for five years. The Secretary may exclude from the suspension any properties under immediate threat of development. (Sperling-Florida)
W75-04772

SOIL CONSERVATION--ADMINISTRATION OF DEPARTMENTS AND CONSERVANCY DISTRICTS.
Iowa Legislative Service, House File 1178, Vol 3, p 292-297, approved May 27, 1974 (1974). 6 p.

Descriptors: *Iowa, *Legislation, *Adoption of practices, *Administration, *Erosion control, Soil conservation, Legal aspects, Soil erosion, Sediment control, Administrative agencies, Decision making, Erosion, Conservation, Land tenure, Regulation, Sedimentation, Sedimentation rates, Administrative decisions, Land management, Water resources development, Surface runoff.
Identifiers: *Administrative regulations, Notice, Nuisance(Legal aspects).

This act relates to the administration of the department of soil conservation, soil conservation districts and conservancy districts in Iowa. The commissioners of any soil conservation district will inspect any land within the district, upon the receipt of a signed complaint, from an owner or occupant of land being damaged by sediment, that soil erosion is occurring in excess of the limits established by the district soil erosion control regulations. If they find that sediment damages are occurring they will issue an administrative order to the landowner, and to the occupant of the land. The order will state as nearly as possible the extent to which soil erosion exceeds the limits established by the district's regulations. The commissioners and their agents have authority, after giving ten days written notice, to enter upon any land without consent to determine whether soil erosion is occurring in violation of the regulations. (Sperling-Florida)
W75-04773

WATERWORKS DEPARTMENT IN CERTAIN CITIES.
Acts of Indiana, Public Law No 81, S. 33, Approved February 21, 1974, Ch. 6.5, p 313-322 (1974). 10 p.

Descriptors: *Indiana, *Legislation, *Adoption of practices, *Administrative agencies, Budget, Contract administration, Decision making, Economic aspects, Eminent domain, Water supply, Water shortage, Public health, Safety, Treatment facilities, Water supply development, Water policy, Water yield, Water purification, Water quality control, Water quality standards.
Identifiers: *State policy.

This Indiana law concern's water works districts in certain cities under Waterworks Department. It defines powers and provides for the imposition of a tax and the issuance of bonds. A waterworks board will be created and composed of five persons appointed by the mayor. They will supervise the waterworks department, which is responsible for the management, control and operation of the filtration and delivery of water within the waterworks district. The waterworks department may prepare budgets for the district. The department may award contracts for the purchase of capital equipment or other property or for the construction of capital improvements. The department may exercise the power of eminent domain. The department will have power to act when it finds existing waterworks are insufficient to furnish a supply of water necessary to protect the public health and safety. The Department may also repair or construct new facilities as necessary. The board must provide an estimate of the cost, specifications, and a description of property rights which are to be acquired. (Sperling-Florida)
W75-04774

UNION OF CONCERNED SCIENTISTS V. ATOMIC ENERGY COMM'N. (REVIEW OF ORDERS OF AEC LICENSING NUCLEAR POWERPLANT).
499 F. 2d 1069 (D.C. Cir. 1974).

Descriptors: *Judicial decisions, *Legal aspects, *Nuclear powerplants, *Water cooling, *Regulation, Licenses, Standards, Thermal pollution, Adoption of practices, Water pollution sources, Engineering structure, Environmental engineering, Administrative agencies, Environmental effects, Design criteria, Specifications, Adjudication procedure, Federal government, Administrative agencies, Administrative decisions.
Identifiers: *Environmental impact statement, *Energy crisis, *Administrative regulations.

This case in the District of Columbia Court of Appeals was an action on petition for review of orders of the Atomic Energy Commission issuing an operating license for a nuclear power station. The court held that the atomic safety licensing board does not have an affirmative duty to evaluate the correctness, rather than the sufficiency of support for uncontested findings. By granting a full-power operating license for a nuclear power plant without first resolving challenges to the interim acceptance criteria for emergency core cooling systems, the commission did not deprive the environmental protection group of due process, violate its own regulations, or abuse its discretion. The commission, it was found, did not act unreasonably in the preparation of a final environmental impact statement prior to the issuance of a license, as well as in the interim acceptance criteria for emergency core cooling systems. (Sperling-Florida)
W75-04775

IN RE HIGHWAY US-24, IN BLOOMFIELD TOWNSHIP, OAKLAND COUNTY (HIGHWAY CONDEMNATION PROCEEDING).
220 N.W.2d 416 (S. Ct. Mich. 1974).

Descriptors: *Eminent domain, *Michigan, *Judicial decisions, *Legal aspects, Environmental control, Water pollution, Water quality, Water law, Legislation, Environmental effects natural resources, Water quality control, Conservation, Adoption of practices, State governments, Water quality standards, Adjudication procedure, Water resources development, Highways, Condemnation.
Identifiers: *Administrative regulations, *State policy.

The Circuit Court held the Highway Condemnation Act unconstitutional as denying due process of law. The Supreme Court reversed holding the Act not to be unconstitutional either as a denial of due process through lack of adequate standards or as a failure to comply with a Michigan constitutional requirement to protect the state's natural resources. The Michigan Constitution states that the legislature must provide for protection of water and other natural resources of the state from pollution, impairment, and destruction. The court, however, held that the legislature is not under a duty to specifically include environmental protection provisions in all relevant legislation. The Environmental Protection Act of 1970 is the chief legislative enactment which fulfills the legislature's duty under the state constitution to protect natural resources. (Sperling-Florida)
W75-04776

WATER POLLUTION--LIQUID WASTES (AS AMENDED).
For primary bibliographic entry see Field 5G.
W75-04777

PROCEDURAL METHODS FOR IMPLEMENTING COLORADO RIVER WATER CONSERVATION MEASURES.
Bureau of Reclamation, Washington D.C.
Federal Register, Vol 37, No 174, p 18076-18078, September 7, 1972.

Descriptors: *Regulation, *Colorado River, *Water conservation, *Boulder Canyon Project Act, Administrative agencies, Water distribu-

tion(Applied), Water resources, Water resources development, Water utilization, Water delivery, Distribution patterns, Distribution systems, Water demand, Water supply, Water requirements, Water contracts, Water law, Legal aspects, Water allocation(Policy), Water rights, Federal government, Planning.
Identifiers: Administrative regulations.

The principal purpose of this revision is to specifically include Indian reservations and federal establishments in the group of water users required to follow water conservation practices, and to provide more positive language to ensure that all water users are properly notified of determinations and have an opportunity to appeal. The procedures established shall apply to every public or private organization in Arizona, California or Nevada which, pursuant to the Boulder Canyon Project Act or to provisions of other Reclamation Laws, has a valid contract for the delivery of Colorado River water, with certain exceptions. The Regional Director of the Bureau of Reclamation shall consult with each user prior to making annual recommendations relating to water conservation measures and operating practices in the diversion, delivery, distribution and use of Colorado River water. Consultations shall also precede the Regional Directors determination of each user's estimated water requirements for the ensuing calendar year so that deliveries of Colorado River water under this program will not prevent delivery of other authorized distributions. (Ritchie-Florida)
W75-04778

AMELIORATION OF EFFECTS OF OIL SPILLS.
Council on Environmental Quality, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04779

BERGEN COUNTY SEWER AUTHORITY V. HACKENSACK MEADOWLANDS DEVELOPMENT COMMISSION (SEEKING DECLARATORY JUDGMENT THAT PLAINTIFF NOT SUBJECT TO LAND USE REGULATIONS OF DEFENDANT IN CONSTRUCTING ADDITION TO SEWAGE PLANT).
324 A.2d 108 (Sup. Ct. N.J., 1974).

Descriptors: *New Jersey, *Judicial decisions, *Regulation, *Jurisdiction, *Land use, *Permits, Public utility districts, Utilities, Water law, Legal aspects, Administrative agencies, Administration, Law enforcement, Environment, Local governments, Environmental control, Land resources, Preservation, Sewage treatment, Water pollution sources, Zoning control, Legislation, Non-structural altenatives, Legal review, Adoption of practices.
Identifiers: *State policy, *Injunctive relief, *Administrative regulations, Declaratory judgment, Environmental policy.

Plaintiff public corporation brought action seeking a declaratory judgment that it was not subject to the land use and building regulations promulgated by the defendant, also a public corporation. The plaintiff, without prejudice to any claim that the defendant lacked jurisdiction over the plaintiff, applied for and was granted a building permit and zoning certificate by the defendant with respect to additions being made to one of plaintiff's sewage treatment facilities. The plaintiff failed to comply with certain conditions attached to the permit and the defendant countered the plaintiff's action with a request for injunctive relief against the violations. Ruling on the defendant's motion, the Superior Court of New Jersey held that the plaintiff was clearly a county agency or instrumentality within the mandate of the Hackensack Meadowlands Act and thus was subject to the regulatory jurisdiction of the defendant. The court issued an injunction against further construction by the plaintiff in violation of the conditions imposed by the permit. (Deckert-Florida)
W75-04780

INCORPORATED VILLAGE OF CORNWALL V. ENVIRONMENTAL PROTECTION ADMINISTRATION OF THE CITY OF NEW YORK (VILLAGE SEEKING ANNULMENT OF WITHDRAWAL OF CONDITIONAL APPROVAL FOR INTERCONNECTION WITH AQUEDUCT FROM UPSTATE WATERSHED AND ISSUANCE OF FINAL APPROVAL OF APPLICATION).
358 N.Y.S.2d 459 (S. Ct. App. Div. 1974).

Descriptors: New York, *Judicial decisions, *Water supply, *Governmental Interrelations, *Legal aspects, Permits, Local governments, State jurisdiction, Regulation, Administration, Legislation, Electric powerplants, Water transfer, Reservoirs, Water conveyance, Water demand, Water allocation(Policy), Water distribution(Applied), Water law, Legal review, Water supply development, Municipal water, Aqueducts, Adjudication procedure, Water policy, Water management(Applied), Administrative decisions.
Identifiers: *Water rights(Non-riparians), *Administrative regulation.

Petitioner, municipality, sought to have the withdrawal of conditional approval for the petitioner's interconnection with the Catskill aqueduct by the respondent, municipal agency, appellant herein, annulled and sought to have the respondent required to issue final approval for the tie-in. The tie-in was required for the petitioner's planned transfer of its municipal reservoir to a private utility as part of the utility's plan for constructing an electric power plant. The petitioner had expended over one million dollars to effectuate the tie-in. The lower court granted the petition and appeal was taken. The appellant contended that it had the right to deny the petitioner's tie-in application. The Supreme Court of New York, Appellate Division, disagreed and affirmed the lower court ruling. The court ruled that the Water Supply Act did not give the appellant the right to deny the petitioner's application in order to keep it from transferring its reservoir to the utility, and the appellant could not collaterally attack a prior federal court judgment holding that the power plant project would not jeopardize the appellant's water supply. (Deckert-Florida)
W75-04781

HENDRIX, ET AL. V. CREEL, ET AL. (ACTION FOR INJUNCTION TO COMPEL MUNICIPAL CORPORATION TO CLEAR AND MAINTAIN DITCH).
297 So. 2d 364 (Ala. 1974).

Descriptors: *Alabama, *Judicial decisions, *Drainage, *Ditches, *Legal aspects, Surface runoff, Adjacent land owners, Water law, Land tenure, Repulsion(Legal aspects), Easements, Legal review, Surface waters, Streams, Real property, Overland flow, Runoff, Local governments, Drainage effects, Flood protection, Prescriptive rights, Common law, Public rights, Adjudication procedure.
Identifiers: *State policy, *Public trust doctrine.

Plaintiff landowners sought injunctive relief compelling the defendant municipality to clear and maintain a drainage ditch which ran across the properties of the plaintiffs and of the defendant adjacent landowners and to restrain the defendant landowner from impeding the flow of the ditch. The ditch was a well-defined ditch or watercourse which, for over 20 years, had been maintained as a drainage ditch by the defendant municipality. The plaintiffs contended that the municipality had acquired a drainage easement across the plaintiff landowners' property by prescription, and that the municipality owed a duty to the plaintiffs and the public to maintain the ditch. The lower court sustained the defendants' demurrers, and the plaintiffs appealed. The Alabama Supreme Court affirmed the lower court ruling and held that the ditch was not of the character of defined stream to which rights attach that are not applicable to surface waters; that the municipality did not gain a prescriptive easement through its prior maintenance of the ditch; and that the municipality had no duty to maintain proper drainage of surface water from the plaintiffs' property. (Deckert-Florida)
W75-04782

JURISDICTION OF SUBMERGED LANDS--GUAM, THE VIRGIN ISLANDS AND AMERICAN SAMOA.
Hearings on H.R. 6775, 4696 and 6135, Subcomm. on Territorial and Insular Affairs, Comm. on Interior and Insular Affairs, 93d Cong, 1st Sess, September 25, 1973. 80 p.

Descriptors: *United States, *Legislation, *Jurisdiction, *Political aspects, Submerged land, Tidal waters, Measurement, Accretion(Legal aspects), Land reclamation, Oil, Petroleum, Boundaries(Property), National parks, Land use, Land tenure, Land management, Land development, Federal government, *Virgin Islands, *Guam.
Identifiers: *American Samoa.

A report is presented of hearings before the Subcommittees on territorial and insular affairs of the United States House of Representatives. They are considering legislation which would place certain submerged lands within the jurisdiction of the governments of Guam, the Virgin Islands, and American Samoa. The bill transfers the interest of the United States in lands permanently or periodically covered by tidal waters, but not above the mean high-tide line, seaward to a line three miles distant from the coastline. This coastline is to be measured as including any modification by accretion, erosion, reliction, and in artificially made, filled-in, or reclaimed lands. Excepted from this transfer are all deposits of oil, gas, and other minerals, not including coral, sand, and gravel. Also excepted are all adjacent property owned by the United States above the line of the mean high tide, any parcels with structures constructed by the United States, lands administered under the National Park Service, and any lands the President may designate within four months of this legislation's enactment. (Sperling-Florida)
W75-04783

OFFSHORE OIL DRILLING AT SANTA BARBARA, PART 1,
Hearing--Subcomm. on Mines and Mining, Comm. on Interior and Insular Affairs, U.S. House of Representatives, 93d Cong, 1st Sess, November 17, 1973. 162 p.

Descriptors: *Legislation, *Federal government, *Oil industry, *Submerged Lands Act, *Continental shelf, Marine geology, Oceans, Pacific Ocean, Oil pollution, Water pollution, Water pollution control, Oil spills, Oil, Fuels, Natural gas, Navigation, Energy, Shores, Resources development, *California, Adoption of practices, Environmental effects, Social benefit.
Identifiers: *Coastal zone management, *Congressional hearing, Navigational obstructions, Santa Barbara(Calif).

Bills limiting oil production in the Santa Barbara Channel were considered in a hearing before the Subcommittee of Mines and Mining of the Committee on Interior and Insular Affairs in Santa Barbara, California, in November 1973. Local citizens expressed their view that future oil drilling and production in the Channel must be considered as a balance between the need for oil and the need to regulate the environmentally and navigationally hazardous methods of retrieving the oil. Past attempts have resulted in damaging oil spills. In leasing resource rich lands to the oil industry the sub-

committee feels that the government has the right to impose environmental safety standards on industry operations in the seismically unstable area. The three bills would establish a federal ecological preserve on a portion of the outer continental shelf in the Santa Barbara Channel; provide for a moratorium on drilling operations pending the development of technology to control and prevent pollution by oil discharges; and to improve methods of oil production from the submerged lands. Specific regulations are set out for termination of leases, the amounts of compromise settlements, and terms to be met to resume oil drilling. (Dillingham-Florada)
W75-04784

AMENDING THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969, TO PROVIDE FOR A NATIONAL ENVIRONMENTAL DATA SYSTEM.
Washington D.C., Committee on Interior and Insular Affairs (U. S. Senate).
Senate Report No 945, 92d Cong, 2d Sess (1972).

Descriptors: Environmental effects, *Data collections, Data storage and retrieval, *Legislation, *Ecology, Automation, Administration, Administrative agencies, Adoption of practices, Legal aspects, Water resources development, Land management, Federal government.
Identifiers: *National Environmental Policy Act, *Congressional hearings.

A proposed congressional amendment to the National Environmental Policy Act of 1969 (NEPA) provides for a national environmental data system. An appropriate network of new and existing information processing or computer facilities will be established. The facilities, both private and public, will be located in various areas of the United States and interconnected through a system of communication with a central facility for input, access and general management. Ancillary software and support services required for effective information system operation are also funded. State or regional environmental centers are to support research, education, planning and land and water management of activities necessary to improve environmental quality. Provisions for the purchase of Klamath Indian Forest lands are included. The purpose of the amendment is to bridge the weaknesses of NEPA in reference to accessibility of environmental data. The Committee on Interior and Insular Affairs endorses the amendmentment and recommends passage. (Sperling-Florida)
W75-04785

NUECES RIVER PROJECT, TEXAS, PART 1.
Hearings--Subcomm. on Water and Power Resources, Comm. on Interior and Insular Affairs, U.S. House of Representatives, 93d Cong, 1st Sess, November 10, 1973. 75 p.

Descriptors: *Texas, *Regional development, *Legislation, *Water resources development, *Public benefits, Government, Legal aspects, Water law, Regulation, Planning, Administration, Reclamation, Regional analysis, Resource allocation, Social aspects, Environmental policy, Water quality, Dam construction, Engineering, Water allocation(Policy), State governments, Federal government, Water management(Applied).
Identifiers: *Congressional hearings, State policy, Private interest groups, Nueces River(Tex).

The bill authorizes the Secretary of the Interior to construct, operate, and maintain the Nueces River Project in Texas and other affiliated projects. Included in the hearing transcript is the text of the bill under consideration. The subcommittee heard testimony dealing with regional reclamation as part of the basin project, water resource planning, and reports submitted by administrators of municipal and county water districts. The hearing also deals with the considerations created by concurrent jurisdiction and differing water policies of various local governments affected by the basin project. To achieve regional water resource planning, local areas have established regional planning commissions and councils of local governments to facilitate intergovernmental responses to regional problems. Resolutions submitted by local municipalities endorsing regional planning and construction, and input of private citizens are included. (Sperling-Florida)
W75-04786

AUTHORIZING THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN THE EAST GREENACRES UNIT, RATHDRUM PRAIRIE PROJECT, IDAHO, AND FOR OTHER PURPOSES.
Committee on Interior and Insular Affairs (U. S. House).
H. R. Rep. No. 987, 91st Cong, 2d Sess (1970).

Descriptors: *Idaho, *Legislation, *Irrigation system, *Water supply, *Water resources development, Multiple purpose projects, Government finance, Recreation, Wildlife conservation, Water sources, Groundwater management, Consumptive use, Economic aspects, Water distribution(Applied), Stream channels, Judicial decisions, Legal aspects, Water conservation, Recreation, Public benefits.
Identifiers: Water rights(Non-riparian), *Administrative regulations.

A report is presented on a bill authorizing the Secretary of the Interior to construct, operate and maintain several projects in Idaho. These projects have multiple purposes of irrigation, municipal and industrial water supply, fish and wildlife enhancement, and recreation. These purposes would be accomplished through the development of a groundwater supply for irrigation to relieve that drain upon Twin Lakes. The community is in need of an adequate and assured water supply for its irrigable lands and domestic use. With such a supply the regional dairy industry could survive. The existing supply of water, obtained from Twin Lakes, is delivered through natural stream channels and poorly maintained open gravity ditches. Serious losses of water are incurred in transit to the lands. The use of Twin Lakes has been further reduced by a decision by the Idaho Supreme Court which limits variation of the water level of Twin Lakes within the range of four feet. (Sperling-Florida)
W75-04787

INTERIM NUCLEAR LICENSING.
Committee on Merchant Marine and Fisheries (U. S. House).
H.R. Rep. No 991, 92d Cong, 2 Sess. (1972).

Descriptors: *Legislation, *Federal government, *Nuclear powerplants, *Permits, Administrative agencies, Supervisory control(Power), Water law, Legal aspects, Regulation, Administration, Nonstructural alternatives, Water quality control, Water pollution sources, Ecology, Electric power production, Environmental control, Interagency cooperation, Water pollution control, Administrative decisions, Environmental effects, Thermal pollution.
Identifiers: Licenses, *National Environmental Policy Act, *Congressional hearings, Administrative regulations, *Environmental impact statements.

The Committee on Merchant Marine and Fisheries, to whom this bill was referred, reported favorably and recommended passage of the amendments to the National Environmental Policy Act of 1969. The purpose of this legislation is to provide interim authority to the Atomic Energy Commission (AEC) to permit the operation of certain nuclear power generating facilities for testing and emergency purposes. This authority applies only to those facilities which have already been constructed under a valid AEC construction license and which lack only an operating license to begin generating electrical power. The AEC may issue such a license only after consultation with the Council on Environmental Quality and the Environmental Protection Agency. The AEC must take environmental consideration into account when issuing a permit. Any permits issued under the authority of this bill would terminate either upon the end of the AEC's NEPA review process or in October 1973. In addition, the AEC has specifically reserved the power to require backfitting of cooling and other facilities at a later date, following full and unabbreviated NEPA review. (Deckert-Florida)
W75-04788

AUTHORIZING THE CITY OF SHERMAN, TEX., TO CONSTRUCT A BARRIER IN DENISON DAM (LAKE TEXOMA) RED RIVER, TEX. AND OKLA., FOR THE PURPOSE OF PROVIDING A MUNICIPAL AND INDUSTRIAL WATER SUPPLY.
H.R. Rep. No 989, Comm. on Public Works, 91st Cong, 2d Sess, April 8, 1970. 3 p.

Descriptors: *Water supply, *Legislation, Dams, *Water storage, *Industrial use, Consumptive use, *Texas, *Oklahoma, Federal government, Economic aspects, Legal aspects, Water resources development, Flood protection, Electric power plants, Recreation, River, Water level, Water distribution(Applied), Navigable waters, Construction, Water conveyance, Water costs, Water conservation, Water law, Public benefits.

A report is presented on a bill authorizing the City of Sherman, Texas, to construct a dam to sub-impound an arm of Denison Dam Lake, Red River, Texas and Oklahoma. The purpose of the sub-impoundment is to provide a municipal and industrial water supply. The bill was reported favorably with amendments. The dam will separate the Big Mineral Arm from Lake Texoma to provide water for Sherman. The proximity of this location to the city would minimize the cost of a transmission line. Population growth expected to the north and northwest makes the site further desirable for a water supply source. This sub-impoundment will not appreciably affect the operation of Denison Dam for the purpose of flood control, hydroelectric power or recreation. Because Lake Texoma constituted navigable waters of the United States specific legislative authority for the construction of a dam is required. The city will reimburse the United States the cost allocable to an amount of storage in the Lake equal to the sub-impoundment, including the loss of power revenues attributable to the sub-impoundment. (Sperling-Florida)
W75-04789

AUTHORIZING THE SECRETARY OF THE INTERIOR TO CONSTRUCT, OPERATE, AND MAINTAIN THE TOUCHET DIVISION, WALLA WALLA PROJECT, OREGON-WASHINGTON, AND FOR OTHER PURPOSES.
H.R. Rep. No 884, Comm. on Interior and Insular Affairs, 91st Cong, 2d Sess, March 9, 1970. 9 p.

Descriptors: *Washington, *Multiple-purpose projects, *Irrigation, *Flood protection, *Water allocation(Policy), Legislation, Administration, Construction, Farm use, Water requirements, Government finance, Water supply, Water storage, Reservoir storage, Reservoir operation, Wildlife conservation, Fishing, Recreation, Consumptive use, Streamflow, Adoption of practices, Surface runoff, Water resources development.

A bill to authorize the Secretary of the Interior to construct, operate, and maintain the Touchet Division, Walla Walla Project, with amendments, was reported upon favorably. Funds are appropriated not only for construction costs, but also for the enhancement of the anadromous fishery. The Walla-Walla project in the state of Washington is a multiple-purpose dam and reservoir to provide

supplemental irrigation water, a full water supply to other land, and storage regulation sufficient to double its present irrigated acreage. The project will also provide for flood control, municipal and industrial water supply, recreation, and on-site fish and wildlife development. The Touchet River Valley is limited in agricultural growth potential by a shortage of dependable irrigation water. Present water supply for irrigation comes from diversion of unregulated streams. The overdevelopment of the Touchet River for irrigation has depleted the flow of the stream seriously. In the summer months the runs of anadromous fish have been destroyed. At other seasons the valley is subject to flood damage due to a lack of control of runoff water. (Sperling-Florida)ll
W75-04790

PHILOSOPHY ON LIVESTOCK WASTE REGULATION,
Missouri Univ., Columbia.
For primary bibliographic entry see Field 5G.
W75-04838

THE RELATIONSHIP BETWEEN ANIMAL WASTES AND WATER QUALITY.
President's Water Pollution Control Advisory Board, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04840

ARKANSAS STATE GAME AND FISH COMM'N. V. EUBANK (SUIT ENJOIN PROPOSED PARTIAL FISH KILL).
512 S W 2d 540 (Ark 1974).

Descriptors: *Judicial decisions, *Arkansas, *Fishkill, *Rotenone, *Legal aspects, Social aspects, State governments, Adoption of practices, Decision making, Administrative agencies, Water law, Administration, Water pollution, Toxic substances, Lakes, Land tenure, Adjacent land owners, Adjudication procedure, Fish management, Water pollution sources.
Identifiers: Injunctive relief, Hazardous substances(Pollution).

A suit to enjoin a proposed partial fish kill was filed against the Arkansas State Game and Fish Commission. In reversing the grant of the injunction the Arkansas Supreme Court said the State Game and Fish Commission was not shown to have acted arbitrarily, capriciously, or in a wantonly injurious manner. The proposed partial fish kill was in a public lake and was opposed by owners of shore property. A state agency may be enjoined if it can be shown that a pending action of the agency would be beyond the scope of the agency's authority. Also an agency can be enjoined if it is about to act in bad faith, arbitrarily, capriciously, or in a wantonly injurious manner. It was contended that the procedure involved in the fish kill constituted a health hazard and that it subjected them and the public to irreparable damage. (Sperling-Florida)
W75-04844

A SURVEY OF FEDERAL AND MISSISSIPPI ENVIRONMENTAL LAW WITH AN EXAMINATION OF ITS EFFECT ON LAND DEVELOPMENT,
Mississippi Univ., University. School of Law.
For primary bibliographic entry see Field 6G.
W75-04845

6F. Nonstructural Alternatives

FLOOD HAZARD REPORTS: TOOLS FOR RESOURCE PLANNING AND MANAGEMENT,
Soil Conservation Service, Grand Rapids, Mich.
For primary bibliographic entry see Field 4A.
W75-04432

FLOOD DISASTER PROTECTION ACT OF 1973.
Hearings--Subcomm. on Housing and Urban Affairs, Comm. on Banking, Housing and Urban Affairs, U.S. Senate, 93d Cong, 1st Sess, October 31, 1973, 151 p.

Descriptors: *Federal government, *Flood plain insurance, *Flood protection, *Water policy, Flood control, Flood plain zoning, Legislation, Environmental control, Environmental effects, Water management(Applied), Land management, Resource allocation, Conservation.
Identifiers: *Congressional hearings.

This proposed legislation amends portions of the National Flood Insurance Act of 1968. To implement the declared purposes of the 1973 Act, subsequent to stipulated findings, both the Senate and the House versions of this Act provide for the expansion of the flood insurance program. This expansion is accomplished by increasing the coverage limits, increasing the limitations on the coverage outstanding and requiring acquisitions and constructions in flood-prone areas to be insured in order to qualify for federal financial assistance. The House version, further, extends the insurance coverage to losses from erosion and the undermining of shorelines. Both versions include disaster mitigation requirements. HUD's tentative identification of a flood-prone area can be controverted by the community's data. The designated community, in the alternative, may make application to participate in the insurance program. The House version proposes an amendment to the appeal procedure of an aggrieved community. Also included are the statements of witnesses and concerned individuals and organizations. (Hall-Florida)
W75-04600

SPECIAL FLOOD HAZARD INFORMATION: CYPRESS CREEK, HARRIS COUNTY, TEXAS.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 4A.
W75-04742

SPECIAL FLOOD HAZARD INFORMATION: CLEAR CREEK, BRAZORIA, FORT BEND, GALVESTON AND HARRIS COUNTIES, TEXAS.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 4A.
W75-04743

FLOOD PLAIN INFORMATION: BLUE RIVER AND TRIBUTARIES, JOHNSON COUNTY, KANSAS.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-04744

FLOOD PLAIN INFORMATION: REPORT ON THE DES PLAINES RIVER, ILLINOIS AND WISCONSIN.
Army Engineer District, Chicago, Ill.
For primary bibliographic entry see Field 4A.
W75-04746

FLOOD PLAIN INFORMATION -- WILLIAMSON CREEK, AUSTIN, TEXAS.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 4A.
W75-04747

FLOOD PLAIN INFORMATION - CEDAR BAYOU, HOUSTON METROPOLITAN AREA, TEXAS.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 4A.
W75-04748

FLOOD PLAIN INFORMATION: BIG CREEK, CHETOLAH CREEK AND LINCOLN DRAW, HAYS, KANSAS.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-04749

FLOOD PLAIN INFORMATION -- GOOSE CREEK, BAYTOWN, TEXAS.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 4A.
W75-04750

FLOOD PLAIN INFORMATION: MECHUNK CREEK, ALBEMARLE COUNTY, VIRGINIA.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W75-04752

FLOOD PLAIN INFORMATION--COASTAL FLOODING, CITY OF CHESAPEAKE, VIRGINIA.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W75-04753

FLOOD PLAIN INFORMATION: (PATUXENT RIVER) WESTERN BRANCH (FOLLY, LOTTSFORD AND VALD HILL BR.), PRINCE GEORGES COUNTY, MARYLAND.
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 4A.
W75-04754

6G. Ecologic Impact Of Water Development

ROOKERY BAY: ECOLOGICAL CONSTRAINTS ON COASTAL DEVELOPMENT,
Conservation Foundation, Washington, D.C.
For primary bibliographic entry see Field 5C.
W75-04354

DELAWARE RIVER BASIN COMPACT: A REVIEW WITH RESPECT TO ENVIRONMENTAL QUALITY,
Pennsylvania Univ., Philadelphia. Inst. for Environmental Studies.
For primary bibliographic entry see Field 6E.
W75-04361

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED CLINTON POWER STATION UNITS 1 AND 2, ILLINOIS POWER COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04395

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF RIVER BEND NUCLEAR POWER STATION, UNITS 1 AND 2, GULF STATES UTILITIES COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04396

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED PILGRIM NUCLEAR POWER STATION UNIT 2 BOSTON EDISON COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04397

HIGH-LEVEL RADIOACTIVE WASTE MANAGEMENT ALTERNATIVES.
Battelle-Pacific Northwest Labs., Richland, Wash.
For primary bibliographic entry see Field 5D.
W75-04402

DIRECTORY OF ENVIRONMENTAL LIFE SCIENTISTS,
Institute of Ecology, Madison, Wis.
Army Corps of Engineers, Washington, D.C., September 1974, 9 volumes, Report EP1105-2-3.

Descriptors: *Scientific personnel, Environment, *Geographical regions, *United States, Classification, *Information exchange, Indexing, Management, Ecosystems, *Professional personnel, Documentation, Evaluation, Foreign countries.
Identifiers: *Environmental impact assessment.

This directory is separately published in 9 volumes for nine regional areas of the U.S., and provides user groups with information about skills and interests of environmental scientists and environment-oriented groups. Each directory is divided into three sections designed to: Locate a scientist within a region of the U.S.; locate a scientist outside of the U.S.; and locate a consulting group anywhere. Separate tables within the first two sections provide an alphabetical listing of respondents (scientists); an index by competence in ecosystem management; an index by research or consultive experience (keywords); an index by impact assessment experience; and an index by scientific field and geographic familiarity. The third section lists environmental consulting groups and associations in alphabetical order. Each directory is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402: Volume 1, North Pacific Region, 603 p, $5.50; Volume 2, South Pacific Region, 726 p, $6.45; Volume 3, Missouri River Region, 525 p, $4.85; Volume 4, Southwest Region, 576 p, $5.30; Volume 5, Northcentral Region, 701 p, $6.25; Volume 6, Lower Mississippi Region, 520 p, $4.85; Volume 7, North Atlantic Region, 698 p, $6.20; Volume 8, Ohio River Valley Region, 664 p, $6.00; and Volume 9, South Atlantic Region, 560 p, $5.15.
W75-04468

ENVIRONMENTAL CONSEQUENCES OF LAND USE IN ARID AND SEMIARID AREAS,
Thessaloniki Univ., Salonika (Greece).
P. A. Gerakis.
Journal of Soil and Water Conservation, Vol 29, No 4, September-October 1974. p 160-164, 3 fig, 22 ref.

Descriptors: *Irrigation, *Land use, *Environmental effects, *Arid lands, *Human population, *Irrigation, Water resources, Planning, Dry farming, Erosion, Ecosystems, Grazing, Africa, Research and Development.

A lack of integrated surveys and local applied research has led to incomplete evaluations of arid and semiarid land resources in developing countries. Types and patterns of land use in these regions are based on water availability for humans, demestic animals, and plants. In addition to following a general strategy of obtaining maximum returns from available resources with a minimum of ecological disturbance, research should be promoted to provide sound environmental impact studies. Experimentation with different land use strategies should be tried, not only to prevent environmental degradation, but to improve ecosystem productivity. This objective cannot be achieved until human population pressures are eased through redistribution or control. (Mastic-Arizona)
W75-04514

ON THE VULNERABILITY OF ECOSYSTEMS DISTURBED BY MAN,
California Univ., Berkeley. Lawrence Berkeley Lab.
For primary bibliographic entry see Field 5C.
W75-04521

ENVIRONMENTAL VALUES AND WATER QUALITY PLANNING,
California Univ., Davis. Div. of Environmental Studies.
For primary bibliographic entry see Field 5G.
W75-04530

EPA TO ISSUE IMPACT STATEMENTS ON SOME REGULATORY ACTIONS,
For primary bibliographic entry see Field 5G.
W75-04586

PROPOSED 1973 OUTER CONTINENTAL SHELF OIL AND GAS GENERAL LEASE SALE OFFSHORE MISSISSIPPI, ALABAMA, AND FLORIDA, VOLUME 4, (FINAL ENVIRONMENTAL STATEMENT),
Bureau of Land Management, Washington, D. C.
For primary bibliographic entry see Field 5G.
W75-04589

PROPOSED 1973 OUTER CONTINENTAL SHELF OIL AND GAS GENERAL LEASE SALE, OFFSHORE MISSISSIPPI, ALABAMA, AND FLORIDA, VOLUME 5, (FINAL ENVIRONMENTAL STATEMENT),
Bureau of Land Management, Washington, D. C.
For primary bibliographic entry see Field 5G.
W75-04590

E.P.A. POLICY TO PROTECT THE NATION'S WETLANDS.
For primary bibliographic entry see Field 5G.
W75-04593

INTERNATIONAL ENVIRONMENTAL BIBLIOGRAPHIES--ENVIRONMENTAL LEGISLATION--NORTH AMERICA.
Environmental Protection Agency, Washington, D.C.
Available from National Technical Information Service, Springfield, Va 22161, U.S. Dept. of Commerce, as PB-227 146, $3.75 in paper copy, $2.25 in microfiche. March 1974, 35 p.

Descriptors: *Environmental sanitation, *Legislation, *Pollution control, *Pollution sources, *North America, Canada, Trinidad, Tobago, United States, Costa Rica, Cuba, Dominican Republic, Guatemala, Honduras, Mexico, Water law, Water resources development, *Bibliographies, Pollution abatement, Water quality control.
Identifiers: Environmental policy.

An annotated bibliography is presented of reports related to national environmental laws in North American countries. Specifically included are pollution control regulations and experiences in implementing legislative authorities. This collection of summarized documents has been received by the United States Environmental Protection Agency from national environmental agencies of other nations. Regulations provide authority to make rules and conduct inspections relating to environmental improvements. Included are specific legislative acts dealing with sanitary control of drinking water, sewage and waste disposal systems and environmental conditions in regard to housing, commercial, and industrial establishments. Included is legislation, which deals with radiation emissions, atomic energy control, and pesticide use in an effort to maintain atmospheric quality standards. (Proctor-Florida)
W75-04594

AQUATIC PLANT CONTROL PROGRAM, STATE OF FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 5G.
W75-04598

ENGINEERING A VICTORY FOR THE ENVIRONMENT: A CITIZEN'S GUIDE TO THE U.S. ARMY CORPS OF ENGINEERS,
Institute for the Study of Health and Society, Washington, D.C.
T. M. Clement, Jr., G. Lopez, and P. T. Mountain.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-231 974. $3.25 in paper copy, $2.25 in microfiche. July, 1971. 396 p, 5 fig, 34 ref, 4 append.

Descriptors: *Legal aspects, *Alternative planning, *Project planning, *Environmental effects, Water law, Judicial decisions, Environmental control, Water resources planning, Water resources development, Cost-benefit analysis, Project benefits, Discount rates.
Identifiers: *Army Corps of Engineers, *Citizen participation in water resource planning.

This action-oriented citizens' handbook on the present practices of the Army Corps of Engineers includes enabling legislation and congressional guidelines for their work. Pros and cons of their projects (dams, navigation assistance, urban flood control, and regulatory activities) are examined. The handbook's purpose is to guide citizens toward effective participation in water resource planning, with particular regard for the water resource projects of the Army Corps of Engineers. The Corps has shown an increasing interest in citizen participation and environmental issues. Efficiency and professionalism of citizen groups must be raised to approximate the high standards of the Corps. Then citizens can work effectively with the Corps, fostering cooperation where possible. Guidelines for citizen group organization and techniques are explained, stressing the political nature of their activity. The mandated 18 steps followed in all large Corps projects from initial planning through completed construction are examined for appropriate timing and method of citizen input. The best stage is clearly the first 6 steps, the planning and hypothesis stage, but even after step 12 (Congressional Authorization of Project Construction) alternative economic analysis based on sound benefit-cost calculations will be considered. Information on how to do benefit-cost analysis, environmental surveys, and discount rate computation is included, as well as analyses of court decisions and 3 case studies showing citizen participation at various steps. Throughout, the emphasis is on thorough, patient, well-informed citizen action. (Herr-North Carolina)
W75-04755

UNION OF CONCERNED SCIENTISTS V. ATOMIC ENERGY COMM'N. (REVIEW OF ORDERS OF AEC LICENSING NUCLEAR POWERPLANT).
For primary bibliographic entry see Field 6E.
W75-04775

AMENDING THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969, TO PROVIDE FOR A NATIONAL ENVIRONMENTAL DATA SYSTEM.
Washington D.C., Committee on Interior and Insular Affairs (U. S. Senate).
For primary bibliographic entry see Field 6E.
W75-04785

A SURVEY OF FEDERAL AND MISSISSIPPI ENVIRONMENTAL LAW WITH AN EXAMINATION OF ITS EFFECT ON LAND DEVELOPMENT,
Mississippi Univ., University. School of Law.
G. T. Abbott, and E. T. Holmes.

Mississippi Law Journal, Vol 45, p 821-885, 1974. 373 ref.

Descriptors: *Mississippi, *Land resources, *Land use, *Regulations, *Environmental control, Federal government, Legislation, Federal Water Pollution Control Act, Clean Air Act, Mississippi, Land development, Natural resources, Land, Water law, Water resources development, Evaluation.
Identifiers: National Environmental Policy Act, State policy, Environmental policy.

Federal and state land use controls exist de facto if not de jure, and are being promulgated and applied under the guise of environmental protection. The history of environmental pollution and control is traced through the period of heightened interest in environmental law which spawned the National Environmental Policy Act (NEPA), the Clean Air Act (CAA) and the Federal Water Pollution Control Act (FWPCA) among others. Mississippi pollution control and coastal land protection legislation is examined, as well as recent court-ordered United States Environmental Protection Agency (EPA) regulations implementing the 'non-degradation' and indirect sources' clauses of the CAA. These regulations will affect state and federal land use control. (Proctor-Florida)
W75-04845

7. RESOURCES DATA

7A. Network Design

STUDY OF OROGRAPHIC EFFECT ON OPTIMUM NUMBER OF RAINGAUGES,
Central Water and Power Research Station, Poona (India).
C. V. Cole, G. A. Kulkarni, and G. D. Khatavkar.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 421-431, 1973. 2 fig, 2 tab.

Descriptors: *Precipitation(Atmospheric), *Orography, *Rain gages, Network design, Watershed management, Rainfall, Watersheds(Basins), Data collections, Statistics.
Identifiers: *India(Bhatghar River-Koyna River).

A close network of adequate number of raingages distributed uniformly over the catchment area generally helps in obtaining the estimate of catchment mean rainfall with the desired degree of precision. Raingall amounts gaged over the existing number of raingage stations situated in two hilly catchments, Bhatghar and Koyna, were analyzed. Bhatghar catchment has an east-west spread and a certain trend in the rainfall while Koyna has a north-south spread and a good deal of variation but no trend in the rainfall. The optimum number of raingages required for these two catchments for estimating mean monthly or seasonal rainfall with a desired degree of accuracy and confidence levels was calculated and compared. Methods of allocation of additional raingages required for the two catchments were considered separately on the basis of their peculiar orographic characteristics. (See also W75-01961) (Sims-ISWS)
W75-04681

SPECTRA OF PRECIPITATION SERIES IN MOUNTAINOUS REGIONS,
Agricultural Research Service, Beltsville, Md. Hydrograph Lab.
D. M. Hershfield, G. H. Comer, and B. Levy.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 432-447, 1973. 6 fig, 3 tab, 4 ref.

Descriptors: *Network design, *Statistics, *Precipitation(Atmospheric), *Time series analysis, Frequency analysis, Rainfall, Watersheds(Basins), Mountains, Storms, Maryland, Idaho, Vermont, Virginia, Hydrology.

Areal variation of precipitation in mountainous areas is a common attribute of observational data. Basic to all investigations that require precipitation information is the development of measures of this variation. Cross spectra determined from series of precipitation data at pairs of nearby stations with differing exposures in mountainous areas were used to examine the variability. The time series consisted of both daily data and short-duration increments from individual major storms from locations in Maryland, Idaho, Vermont, and Virginia. The statistics provided a measure of the persistence and uniformity of the precipitation between the gages, and hence, an indication of the spatial and temporal resolution required for the establishment of an adequate network. The techniques applied to the data were particularly useful in the development of models for predictive purposes in watershed hydrology. The most immediate application is for network design because it provides a measure of the uniformity and persistence of precipitation in time over short distances, and therefore, is an indication of the spatial and temporal resolution required to describe the precipitation characteristics. (See also W75-01961) (Sims-ISWS)
W75-04682

THE USE OF THE MODIFIED TIME SERIES ANALYSIS TECHNIQUE FOR THE DETERMINATION OF AREAL PRECIPITATION ACCURACIES,
Aston Univ., Birmingham (England).
For primary bibliographic entry see Field 2B.
W75-04683

ERROR IN INTERPOLATION AND CHOICE OF THE RANGE OF DISCRETENESS IN MEASUREMENTS IN A HYDROPHYSICAL FIELD,
O. F. Zudin, and B. A. Nelepo.
In: NASA TT F-801, p 71-79, November 1974. 1 fig, 2 ref.

Descriptors: *Numerical analysis, Analytical techniques, *Data processing, Measurement, Equations.
Identifiers: *Interpolation, *Errors.

Errors in interpolation and the choosing of the range of discreteness when making measurements in a hydrophysical field were discussed. Equations for optimum interpolating based on the theory of linear interpolation of stationary random sequences were presented; analogous equations were derived for the case of data collected at stations located at the apexes of a right triangle. (See also W75-04729) (Sims-ISWS)
W75-04734

7B. Data Acquisition

IDENTIFICATION AND EVALUATION OF WATER TRACERS AMENABLE TO POST-SAMPLING NEUTRON ACTIVATION ANALYSIS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 5A.
W75-04355

METHOD FOR THE CONSTRUCTION OF THREE-DIMENSIONAL ELECTRON MICROGRAPHS,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 5A.
W75-04394

SOME CHARACTERISTICS OF HAWAIIAN HIGH-INTENSITY RAINFALL,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 2B.
W75-04442

EVALUATION OF THE FILTER PAPER METHOD FOR ESTIMATING SOIL WATER POTENTIAL,
Utah State Univ., Logan.
For primary bibliographic entry see Field 2G.
W75-04506

THE EFFECT OF SOIL TEXTURE AND DENSITY ON THE NEUTRON AND DENSITY PROBE CALIBRATION FOR SOME TROPICAL SOILS,
International Inst. of Tropical Agriculture, Ibadan (Nigeria).
For primary bibliographic entry see Field 2G.
W75-04549

A NONDESTRUCTIVE METHOD OF FOLLOWING MOISTURE CONTENT AND TEMPERATURE CHANGES IN SOILS USING THERMISTORS,
Sydney Univ. (Australia). Dept. of Soil Science.
For primary bibliographic entry see Field 2G.
W75-04605

ISOTOPIC AND CHEMICAL CONSIDERATIONS IN RADIOCARBON DATING OF GROUNDWATER WITHIN THE ARID TUCSON BASIN, ARIZONA,
Arizona Univ., Tucson. Dept. of Geosciences.
E. I. Wallick.
PhD Dissertation, 1973. 184 p, 15 fig, 19 tab, 80 ref, append.

Descriptors: *Groundwater basins, *Radioactive dating, *Arizona, *Chemical analysis, *Model studies, *Computer models, Carbon calcite, Carbon radioisotopes, Aquifers, *Chemical properties, Calcium carbonate, Carbon dioxide, Well data, Wells.
Identifiers: Tucson Basin.

A chemical-isotopic equilibrium model was developed for adjustment of radiocarbon ages of groundwater from the arid Tucson basin for dilution of the initial groundwater C-14 activity by the solution of soil calcite having a C-14 of 25 plus or minus, 19% modern. Input to the model consisted of the laboratory chemical analyses for Ca ++, Mg ++, Na+, K+, H4SiO4, SO4=, HCO3-, CO3=, NO3-, and pH, and delta C-13 for the total dissolved carbon in the groundwater. Output consisted of the equilibrium chemical composition of the groundwater, the ratio of soil CO2 derived to total dissolved carbon, Q, and delta C-13 of total dissolved carbon, H2CO3, HCO3-, and CO3= and delta C-13 for the soil CO2 and calcite that initially dissolved in the surface water as it equilibrated with soil minerals. Radiocarbon age of the groundwater is computed from the equation T = 8270 In ((Q + (1-Q) ACaCO3)/Am) where T is the age in years before A.D. 1950, ACaCO3 is the soil calcite activity and Am is the measured activity for the dissolved carbonate in the groundwater, both with respect to modern wood. The validity of the model was tested by comparing the predicted values for delta C-13 (CO2), delta C-13 (CaCO3) with measured values for samples from the Tucson basin. On the basis of these results, the model adequately describes the natural system and may prove useful in future radiocarbon dating work in desert regions.
W75-04647

IMPROVED INSTRUMENTATION FOR MEASURING MELTED PRECIPITATION ON WIND-SWEPT TOPOGRAPHY,
Forest Service (USDA), Moscow, Idaho. Intermountain Forest and Range Experiment Station.
H. F. Haupt.
In: Distribution of Precipitation in Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 73-85, 1973. 3 fig, 4 tab, 14 ref.

Descriptors: *Snowmelt, *Mountains, *Lysimeters, Snow, Rain gages, Mountain forests, Snowpack, Water equivalent, Winds, *Idaho, Precipitation(Atmospheric), *Instrumentation, Measurement.
Identifiers: Windshields, Priest River(Utah), Selkirk Mountain Range(Utah).

The winter performances of three instruments: (1) a standard weighing gage with horizontal orifice and windshield, (2) a similar gage with modified (stereo) orifice and tilted windshield parallel to the slope inclination, and (3) a dual-purpose net precipitation-snowmelt lysimeter--were compared in openings and coniferous forest on the windward and lee side of a mountain ridge in northwestern United States. Mounted on towers in windswept openings, the standard gage-horizontal shield and modified gage-tilted shield were less efficient than the ground-level lysimeter by 49% and 24%, respectively. The lysimeter proved most superior in measuring total seasonal (melted) precipitation. Furthermore, in the windswept forest the lysimeter outperformed the standard and modified gages, but the modified gages were nearly alike in total catch. On the lee side, protected in part from the full blast of wind, the lysimeter was only 7 to 8% more efficient than the mounted gages. (See also W75-01961) (Jones-ISWS)
W75-04655

PRECIPITATION MEASUREMENTS BY MEANS OF STORAGE GAUGES WITH STEREO AND HORIZONTAL ORIFICES IN THE BAYE DE MONTREUX WATERSHED,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau, Hydrologie und Glaziologie.
B. Sevruk.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 86-95, 1973. 4 fig, 3 tab, 35 ref.

Descriptors: *Rain gages, *Mountains, Orifices, Precipitation(Atmospheric), Slopes, Winds, Snowfall, Topography, Instrumentation, Measurement.
Identifiers: *Stereo gages, *Storage gages, Ridges, Mougin storage gas, Nipher-Billwiller windshields, *Switzerland(Baye de Montreux).

On the steep, open slopes in the proximity of the ridges which are exposed to the rain-bearing westerly winds, the stereo orifices yielded precipitation figures about twice as high as those collected by horizontal orifices. At half the height of the slope in the wooded zone and in sheltered locations, the stereo orifices yielded only a small increase or none at all. The increase of precipitation with altitude was more clearly evidenced in the values of the instruments with orifice surfaces parallel to the slope than in those with horizontal orifices. The results obtained with measurements over a period of 19 years show that stereo orifices are better suited than horizontal orifices for meeting the requirements of precipitation measurements on steep, open slopes exposed to rain-bearing winds. (See also W75-01961) (Jones-ISWS)
W75-04656

EVAPORATION LOSSES FROM STORAGE GAUGES,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau, Hydrologie und Glaziologie.
B. Sevruk.
In: Distribution of Precipitation In Mountainous Areas, Vol. II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 96-102, 1973. 4 fig, 3 tab, 20 ref.

Descriptors: *Raingages, *Evaporation, Snow, Solar radiation, Air temperature, Seasonal, Statistical methods, Regression analysis, Saturation.
Identifiers: *Storage gages, Wind shields, Mougin gage.

In many countries responsible meteorological services accept an oil layer 2 to 3 millimeters thick for the prevention of evaporation errors in precipitation measurements with storage gages. The results of the investigations described showed that an oil layer of this thickness cannot prevent evaporation from the storage gages and, particularly in summer, the layer may be a further source of errors in precipitation measurements with storage gages. This was also demonstrated by an example from a test area near Lake Geneva where over a period of ten years a storage gage with a 2-mm oil layer recorded an average of about 6% less precipitation in summer than the daily measurements with a standard precipitation gage. (See also W75-01961) (Jones-ISWS)
W75-04657

ANALYSIS OF SNOW COVER DISTRIBUTION FROM AEROPHOTOGRAPHY DATA OVER EXPERIMENTAL MOUNTAIN BASIN OF VARZOB RIVER,
Hydrometeorological Service of the USSR, Moscow.
T. S. Abaljan.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 103-110, 1973. 3 fig, 4 tab, 7 ref.

Descriptors: *Precipitation(Atmospheric), *Snow cover, Water resources, Hydrology, Aerial photography, Snowmelt, Avalanches, Slopes, Snow surveys, Distribution patterns.
Identifiers: *USSR(Varzob River Basin).

The Varzob River Basin was photographed from the air from 7-9 times within each snow melting period of the years 1964-1967. These photographs were used to calculate the snow-covered area at 400 m height intervals. The photographs were also used to determine the change in snow cover as the cover melted and a relationship was established between the snow cover melt and the positive mean daily air temperature. The time interval for the calculation was for 5 days and interpolation was required for these intermediate intervals since photographs were not taken this often. The effects on the distribution of snow by avalanches was noted. (See also W75-01961) (Jones-ISWS)
W75-04658

DEFICIENCIES IN MEASURED SNOW PRECIPITATION IN A MOUNTAINOUS AREA IN NORWAY,
Norwegian Water Resources and Electricity Board, Oslo (Norway).
For primary bibliographic entry see Field 2C.
W75-04684

PRECIPITATION ESTIMATES FROM METEOROLOGICAL SATELLITE DATA,
Stanford Research Inst., Menlo Park, Calif.
For primary bibliographic entry see Field 2B.
W75-04685

AREA PRECIPITATION MEASUREMENT WITH X-BAND RADAR FROM A MOUNTAIN NORTH OF THE ALPS,
Deutscher Wetterdienst, Hohenpeissenberg (West Germany). Meteorologisches Observatorium.
W. Attmannspacher.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 544-551, 1973. 6 fig, 1 tab, 2 ref.

Descriptors: *Radar, *Rainfall, *Remote sensing, Rain gages, Measurement, Networks, Mountains, Meteorology, Precipitation(Atmospheric), Statistics.
Identifiers: *Germany(Hohenpeissenberg Mt).

At the isolated mountain peak Hohenpeissenberg measurements of precipitation over an area by aid of an X-band radar were started in 1969. The method of this research and the requirement on the radar equipment were discussed. The results show that the method of measuring areal precipitation by radar is useful, but the attenuation of the radar beam caused by precipitation is too strong for the 3.2 cm wave length; thus, only special cases can be measured exactly. (See also W75-01961) (Sims-ISWS)
W75-04691

A LEAK-PROOF SAMPLING PORT IN GAS ANALYSES STUDIES,
Guelph Univ., (Ontario). Dept. of Land Resource Science.
A. E. Smid, and E. G. Beauchamp.
Soil Science Society of America Proceedings, Vol 38, No 6, p 983-984, November-December 1974. 2 fig, 9 ref.

Descriptors: *Sampling, *Gases, Microbial degradation, Soil gases, Analytical techniques, Nitrogen, *Gas chromatography.
Identifiers: *Serum caps, Septum.

Unmodified rubber serum caps frequently used as sampling ports in gas analysis studies failed to reseal after being punctured. Mean N2 leakage through puncture holes increased from 92 to 5200 microliters/liter after 24 hours with one puncture and to 12,000 microliters/liter after an additional 24 hours with two puncture holes. Leak-proof serum caps were devised by sealing silicone rubber septa into them with silicone rubber sealant. (Visocky-ISWS)
W75-04697

A METHOD FOR MEASURING FIRST-STAGE SOIL WATER EVAPORATION IN THE FIELD,
Agricultural Research Service, Temple, Tex. Blackland Conservation Research Center.
For primary bibliographic entry see Field 2D.
W75-04698

MICROMETEOROLOGICAL MEASUREMENTS FOR PESTICIDE DRIFT STUDIES,
Missouri Univ., Columbia. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5B.
W75-04714

AN ASSESSMENT OF WARM FOG - NUCLEATION, CONTROL, AND RECOMMENDED RESEARCH,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering; and Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
For primary bibliographic entry see Field 2B.
W75-04717

ATMOSPHERIC WATER RESOURCES MANAGEMENT PROGRAM - BRIDGER RANGE CLOUD SEEDING EXPERIMENT,
Montana State University, Bozeman. Dept. of Earth Sciences.
For primary bibliographic entry see Field 3B.
W75-04721

ATMOSPHERIC MOISTURE PARAMETERIZATION,
Environmental Technical Applications Center, Washington, D.C.
For primary bibliographic entry see Field 2B.
W75-04724

INVESTIGATION OF LAND USE OF NORTHERN MEGALOPOLIS USING ERTS-1 IMAGERY,
Dartmouth Coll., Hanover, N.H. Dept. of Geography.
For primary bibliographic entry see Field 7C.
W75-04726

THE PROBLEM OF SELECTING AN OPTIMUM FREQUENCY FOR A MEASURING GENERATOR IN DETERMINING THE VALUE OF THE HYDROPHYSICAL PARAMETER WITH A GIVEN ACCURACY,
V. A. Stepanyuk.
In: NASA TT F-801, p 80-84, November 1974. 1 ref.

Descriptors: *Instrumentation, *Electrical equipment, *Measurement, Oceanography, Generators, Statistical methods, Temperature.

The selection of the optimum frequency for a measuring generator for determining the value of the hydrophysical parameter with a given degree of accuracy was discussed. Methods from information theory for measuring generators were described. Conversion of the frequency of generators into digital form by means of statistical averaging was also described. (See also W75-04729) (Sims-ISWS)
W75-04735

THE OBJECTIVE ANALYSIS OF RELATIVE HUMIDITY,
British Meteorological Office, Bracknell (England).
For primary bibliographic entry see Field 2B.
W75-04791

A CRITICAL EXAMINATION OF THE TURBULENCE INSTRUMENT USED IN THE MARSTA MICRO-METEOROLOGICAL FIELD PROJECT,
Uppsala Univ. (Sweden). Dept. of Meteorology.
U. Hogstrom.
Tellus, Vol 26, No 6, p 672-681, 1974. 9 fig, 9 ref.

Descriptors: *Turbulence, *Instrumentation, Winds, Temperature, On-site investigations, Water vapor, *Measurement, Flow, *Meteorology, Evaluation.
Identifiers: *Error analysis, *Dynamic response, Wind tunnel tests, Micro-meteorology.

A turbulence instrument described earlier (Hogstrom, 1967), and used in an extensive micrometeorological field project, was examined critically. Static wind tunnel calibrations gave accurate, reproducible results. Field measurements and theoretical considerations indicated complications in the dynamical situation, however. It was shown that the instrument is well suited for the measurement of the horizontal component of the wind and its rapid fluctuations. For the measurement of the turbulent fluxes of sensible heat and of water vapor a correction of order of magnitude 10% must be applied. The instrument was further shown to be unsuited for measuring the shearing stress and the variance of the vertical velocity component. (Jones-ISWS)
W75-04795

SENSITIVITY DISTRIBUTION ALONG THE STRIPS OF COMPENSATION PYRHELIOMETERS,
Institute for Atmospheric Physics, Budapest (Hungary).
G. Major, I. Mersich, and F. Miskolci.
Tellus, Vol 26, No 6, p 691-693, 1974. 4 fig, 9 ref.

Descriptors: *Radiation, Instrumentation, Solar radiation, Measurement, Laboratory tests, Distribution, Methodology, Meteorology.
Identifiers: *Pyrheliometers, Sensitivity, Thermojunction, Distribution curves.

Different sensitivity distribution curves had been found for the sensor of compensation pyrheliometer by laboratory measurement and by calculation. To obtain the real sensitivity distribution a new measuring method was applied, which used the sun as radiation source. The results of laboratory and field measurements were in proper agreement. The sensitivity curve was determined mainly by the structure of thermojunction, but each strip has individual characteristics. (Jones-ISWS)
W75-04796

ROUTINE SURVEILLANCE ALTERNATIVES FOR WATER QUALITY MANAGEMENT,
Colorado State Univ., Fort Collins. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5A.
W75-04803

WATER QUALITY BY PHOTOGRAPHIC ANALYSIS,
Wisconsin Univ., Madison.
For primary bibliographic entry see Field 5A.
W75-04814

SPHERE METHOD TURBIDIMETER,
Nippon Precision Optical Instrument, Co. Ltd., Tokoyo (Japan).
For primary bibliographic entry see Field 5A.
W75-04819

7C. Evaluation, Processing and Publication

CORRELATION OF HYDROLOGIC MODEL PARAMETERS WITH CHANGING LAND USE AS DETERMINED FROM AERIAL PHOTOGRAPHS,
Clemson Univ., S. C. Dept. of AGgricultural Engineering.
For primary bibliographic entry see Field 4C.
W75-04448

NOTES--WORKSHOP ON COMPUTER-AIDED DESIGN AND SIMULATION OF WASTE TREATMENT SYSTEMS,
Silveston (B and P), Kitchener (Ontario).
For primary bibliographic entry see Field 5D.
W75-04518

A SYSTEMS ANALYSIS OF WATER QUALITY SURVEY DESIGN,
Clemson Univ., S. C.
For primary bibliographic entry see Field 5B.
W75-04522

COMPUTER USE FOR RIVER REGULATION,
Corps of Engineers, Portland, Oreg. North Pacific Div.
For primary bibliographic entry see Field 4A.
W75-04531

OPTIMAL OPERATION OF MULTIPLE RESERVOIR SYSTEM,
State Univ. of New York, Buffalo. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-04532

COMPUTER CONTROL OF CHEMICAL ADDITION AT A WATER-TREATMENT PLANT,
Autocon Industries, St. Paul, Minn.
For primary bibliographic entry see Field 5F.
W75-04535

SOLUTION OF SIMULTANEOUS PARTIAL DIFFERENTIAL EQUATIONS: AN EXTENSION OF PDEL,
California Univ., Los Angeles.
For primary bibliographic entry see Field 6A.
W75-04539

PARAMETER IDENTIFICATION IN DISTRIBUTED SYSTEMS USING A DIGITAL SIMULATION LANGUAGE: AN EXTENSION OF PDEL,
California Univ., Los Angeles.
For primary bibliographic entry see Field 6A.
W75-04540

APPLICATION OF THE MAIN II WATER FORECASTING SYSTEM TO WYOMING COMMUNITIES,
Wyoming Univ., Laramie.
For primary bibliographic entry see Field 6D.
W75-04541

COASTAL MAPPING ACT,
For primary bibliographic entry see Field 6E.
W75-04582

PHYSIOGRAPHICALLY ADJUSTED PRECIPITATION-FREQUENCY MAPS,
National Weather Service, Silver Spring, Md. Office of Hydrology.
For primary bibliographic entry see Field 2B.
W75-04672

AREAL RAINFALL ANALYSIS BY COMPUTER,
British Meteorological Office, Bracknell (England).
P. M. Salter.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 497-509, 1973. 4 fig, 5 tab, 8 ref.

Descriptors: *Rainfall, *Data storage and retrieval, *Mapping, Isohyets, Contours, *Computer programs, Data processing, *Areal hydrogeology.
Identifiers: United Kingdom.

The plotting and drawing of isohyetal charts by hand is laborious. The ever-increasing amount of past rainfall data now available in computer-compatible form invites use of the computer to do this work. The method adopted for use for any required area in the United Kingdom is based on a 5-km grid. Rainfall values for the grid points are obtained by interpolation from the irregular station network; an allowance is made for the effects of topography by use of a background field of average annual rainfall. Having obtained grid-point values for this relatively dense and regular network, areal rainfalls over irregular areas may be calculated simply by averaging values within the area. Computer prepared isohyetal charts are sufficiently accurate for many purposes and areal rainfalls for areas of 200 sq km or more can be ob-

tained for most parts of the country. The minimum area may not be as low for an area with a sparse station network. (See also W75-01961) (Sims-ISWS)
W75-04687

COMPUTERIZED CALCULATION OF AREAL PRECIPITATION AND ITS ACCURACY,
Techische Universitaet, Brunswick (West Germany). Leichtweiss Inst. for Water Research.
H. Vahl.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No. 326 (2 Vol.), Geneva, Switzerland, p 510-524, 1973. 8 fig, 9 ref.

Descriptors: *Data processing, *Analytical techniques, *Precipitation(Atmospheric), *Areal, Computer programs, Average, Rainfall, Isohyets, Graphical analysis, Numerical analysis, Floods.
Identifiers: Interpolation methods, Thiessen polygons, Germany.

In accordance with the well-known graphical-numerical methods of the computation of areal precipitation, computerized methods were developed and the feasibility of their application was investigated. The accuracy of the results from the computation of areal precipitation of annual and daily amounts of rainfall was compared with the traditionally applied method. The investigations were carried out on a watershed in northwestern Germany with an area of about 4400 sq km and a maximum network density of rain gaging stations of about 2.0 stations per 100 sq km. The developed procedures were briefly described and the results obtained by a large statistical evaluation were discussed. (See also W75-01961) (Sims-ISWS)
W75-04688

A HYBRID COMPUTER SIMULATION MODEL FOR PREDICTING THE EFFECTS OF THE AREAL DISTRIBUTION OF PRECIPITATION ON RUNOFF CHARACTERISTICS,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 2B.
W75-04692

ESTIMATING AREAL RAINFALL BY FITTING SURFACES TO IRREGULARLY SPACED DATA,
Institute of Hydrology, Wallingford (England).
K. A. Edwards.
In: Distribution of Precipitation In Mountainous Areas, Volume II; Proceedings of the Geilo Symposium, Geilo, Norway, July 31-August 5, 1972. World Meteorological Organization Publication No 326 (2 Vol.), Geneva, Switzerland, p 565-587, 1973. 3 fig, 5 tab, 12 ref.

Descriptors: *Data processing, *Rainfall, *Precipitation(Atmospheric), Average, *Estimating, Model studies, *Areal, Computer models.
Identifiers: *Trend surface fitting, Polynomial surfaces, Double Fourier surfaces.

Some of the most promising fully automated methods of estimating mean areal rainfall involve the fitting of rainfall surfaces to the data points by least-square techniques. Polynomial surfaces (trend surfaces) were compared with double Fourier series surfaces in terms of their goodness of fit to the observed data and the effects of including altitude as a further variable were examined. Methods of simplifying these techniques for practical use were discussed. (See also W75-01961) (Sims-ISWS)
W75-04693

UNSTEADY, UNSATURATED, N-DIMENSIONAL MOISTURE FLOW IN SOIL: A COMPUTER SIMULATION PROGRAM,
Goettingen Univ. (West Germany).
For primary bibliographic entry see Field 2G.
W75-04701

INVESTIGATION OF LAND USE OF NORTHERN MEGALOPOLIS USING ERTS-1 IMAGERY,
Dartmouth Coll., Hanover, N.H. Dept. of Geography.
R. B. Simpson, D. T. Lindgren, D. J. Ruml, and W. Goldstein.
NASA Contractor Report CR-2459, p 56, September 1974. 19 fig, 4 tab, 13 ref, 2 append.

Descriptors: *Remote sensing, *Satellites(Artificial), *Land use, *Urban mapping, Land management, Aerial photography, Planning, Geographical regions, Rhode Island, Connecticut, Massachusetts, Cities, Urbanization, *City planning.
Identifiers: Urban geography, Megalopolis, ERTS.

An urban type land use map was developed for Rhode Island by using ERTS imagery. The development of land use maps for Massachusetts and Connecticut was also described. It was shown that it is practical to compile multi-category land use maps from ERTS. The use of manual read-in by grid cell provides a rapid and inexpensive method of converting a manually compiled land use map to a more broadly useful and flexible digital data base. (Terstriep-ISWS)
W75-04726

AUTOMATION OF THE COLLECTION AND ANALYSIS OF SCIENTIFIC INFORMATION IN THE PROBLEM OF THE INTERACTION OF THE ATMOSPHERE AND OCEAN,
Linguistic Systems, Inc., Cambridge, Mass.
For primary bibliographic entry see Field 2B.
W75-04729

AUTOMATED SYSTEM FOR MEASUREMENT, COLLECTION AND PROCESSING OF HYDROMETEOROLOGICAL DATA ABOARD SCIENTIFIC RESEARCH VESSELS OF THE GUGMS (SIGMA-S),
Ye. P. Borisenkov, and O. M. Fedorov.
NASA TT F-801, p 1-18, November 1974, 2 fig, 12 ref.

Descriptors: *Research facilities, *Instrumentation, *Data processing, *Oceanography, Meteorology, Automation, Research equipment, Ships, Foreign research, Hydrography.
Identifiers: Scientific research vessels.

The automated system known as SIGMA-s for the measurement, collection, and processing of hydrometeorological data aboard scientific research vessels of the Hydrometeorological Service was discussed. The various components of the system and the interfacing between them were described, as well as the projects that the system is equipped to handle. (See also W75-04729) (Sims-ISWS)
W75-04730

SOFTWARE FOR THE SIGMA-S,
I. A. Dyubkin.
In: NASA TT F-801, p 19-33, November 1974. 2 fig, 18 ref.

Descriptors: *Data processing, *Computer programs, *Oceanography, *Meteorology, Automation, Algorithms, Computers, Mathematics.
Identifiers: Interpolation.

The software needed for the SIGMA-s was described. Various mathematical procedures, such as introducing corrections and parameters, interpolating for depth and altitude, isolating special points and layers in the distribution of hydrometeorological elements, smoothing of signals from sensors, critical analysis of and setting up the results in graphs and tables, coding of the data into information carriers, and recording of the data, were presented. (See also W75-04729) (Sims-ISWS)
W75-04731

THE PROBLEM OF ORGANIZATION OF A COASTAL COORDINATING COMPUTER CENTER,
I. A. Dyubkin, and I. I. Lodkin.
In: NASA TT F-801, p 34-48, November 1974. 4 fig, 11 ref.

Descriptors: *Data storage and retrieval, *Data processing, *Management, Meteorology, Oceanography, Computers, Coordination.

Fundamental principles were provided of the operation of a coastal coordinating and computing center under conditions of automation. Special attention was devoted to the work of Coastal Computer Center of the Arctic and Antarctic Scientific Research Institute. This center generalizes from data collected in expeditions and also from observations made at polar stations. (See also W75-04729) (Sims-ISWS)
W75-04732

A SYSTEM OF AUTOMATED PROCESSING OF DEEP WATER HYDROLOGICAL INFORMATION,
V. A. Romantsov, I. A. Dyubkin, and L. N. Klyukbin.
In: NASA TT F-801, p 49-70, November 1974. 1 fig, 2 tab, 23 ref.

Descriptors: *Data processing, *Oceanography, Computers, Automation, Computer programs, Water chemistry.

An automated system for primary and scientific analysis of deep water hydrological information was presented. Primary processing of the data in this system is carried out on a drifting station, which also calculates the parameters of vertical stability of the sea layers, as well as their depths and altitudes. Methods of processing the raw data were described. (See also W75-04729) (Sims-ISWS)
W75-04733

ERROR IN INTERPOLATION AND CHOICE OF THE RANGE OF DISCRETENESS IN MEASUREMENTS IN A HYDROPHYSICAL FIELD,
For primary bibliographic entry see Field 7A.
W75-04734

THE PROBLEM OF SELECTING AN OPTIMUM FREQUENCY FOR A MEASURING GENERATOR IN DETERMINING THE VALUE OF THE HYDROPHYSICAL PARAMETER WITH A GIVEN ACCURACY,
For primary bibliographic entry see Field 7B.
W75-04735

SMALL PARAMETRIC MODEL OF THE PRECOMPUTATION OF METEOROLOGICAL FIELDS ON THE BASIS OF COMPLETE EQUATIONS AND ITS ENERGETIC ANALOGS,
Ye. P. Borisenkov.
In: NASA TT F-801, p 85-111, November 1974. 18 ref.

Descriptors: *Mathematical models, *Meteorology, Equations, Wind velocity, Thermodynamics, Oceans, Parametric hydrology, Energy, Hydrodynamics.

A small parametric, nonadiabatic model for precomputation of meteorological fields on the basis of complete equations, along with its energetic analogs, was described. The model incorporates integral characteristics of the components of the wind speed and the analogous functions of the total fluxes of the ocean, and uses a Cartesian isobaric system of coordinates. (See also W75-04729) (Sims-ISWS)
W75-04736

ESTIMATE OF HEAT FLUXES ON THE SUBJACENT SURFACE (ACCORDING TO DATA FROM SYNOPTIC ANALYSIS),
A. P. Nagurnyy.
In: NASA TT F-801, p 112-120, November 1974. 2 fig, 6 ref.

Descriptors: *Mathematical models, *Heat flow, Model studies, *Meteorology, *Heat transfer, Data processing, Air circulation, *Synoptic analysis, Convection, Temperature.

Several methods of estimating heat fluxes from nonadiabatic sources distributed over a subjacent surface were discussed. Data calculated by synoptic analysis for the entire northern hemisphere from aerological soundings at the 500 and 400 absolute temperature levels, along with the temperature of the subjacent surfaces, were used. A polytropic model of the atmosphere was used in order to avoid the problems posed by the lack of any complete theory of heat transfer in the lower atmosphere. (See also W75-04729) (Sims-ISWS)
W75-04737

A SMALL-PARAMETER MODEL OF CIRCULATION IN AN HOMOGENEOUS BAROCLINIC OCEAN,
For primary bibliographic entry see Field 2L.
W75-04738

THE PROBLEM OF THE INFLUENCE OF OCEAN CURRENTS ON FREE INTERNAL GRAVITY WAVES,
For primary bibliographic entry see Field 2L.
W75-04739

THE PROBLEM OF CALCULATING CLOUD COVER IN CALCULATIONS OF LONG WAVE RADIATIONAL CHARACTERISTICS OF THE ATMOSPHERE,
For primary bibliographic entry see Field 2B.
W75-04740

RECONSTRUCTING THE VERTICAL PROFILE OF HUMIDITY ON THE BASIS OF THE VERTICAL PROFILE OF TEMPERATURE,
For primary bibliographic entry see Field 2B.
W75-04741

SPECIAL FLOOD HAZARD INFORMATION: CYPRESS CREEK, HARRIS COUNTY, TEXAS.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 4A.
W75-04742

SPECIAL FLOOD HAZARD INFORMATION: CLEAR CREEK, BRAZORIA, FORT BEND, GALVESTON AND HARRIS COUNTIES, TEXAS.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 4A.
W75-04743

FLOOD PLAIN INFORMATION: BLUE RIVER AND TRIBUTARIES, JOHNSON COUNTY, KANSAS.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-04744

FLOOD PLAIN INFORMATION: NORTH FORK RIVANNA RIVER, ALBEMARLE COUNTY, VIRGINIA.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W75-04745

FLOOD PLAIN INFORMATION: REPORT ON THE DES PLAINES RIVER, ILLINOIS AND WISCONSIN.
Army Engineer District, Chicago, Ill.
For primary bibliographic entry see Field 4A.
W75-04746

FLOOD PLAIN INFORMATION -- WILLIAMSON CREEK, AUSTIN, TEXAS.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 4A.
W75-04747

FLOOD PLAIN INFORMATION - CEDAR BAYOU, HOUSTON METROPOLITAN AREA, TEXAS.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 4A.
W75-04748

FLOOD PLAIN INFORMATION: BIG CREEK, CHETOLAH CREEK AND LINCOLN DRAW, HAYS, KANSAS.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-04749

FLOOD PLAIN INFORMATION -- GOOSE CREEK, BAYTOWN, TEXAS.
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 4A.
W75-04750

FLOOD PLAIN INFORMATION: MECHUNK CREEK, ALBEMARLE COUNTY, VIRGINIA.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W75-04752

FLOOD PLAIN INFORMATION--COASTAL FLOODING, CITY OF CHESAPEAKE, VIRGINIA.
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W75-04753

FLOOD PLAIN INFORMATION: (PATUXENT RIVER) WESTERN BRANCH (FOLLY, LOTTSFORD AND VALD HILL BR.), PRINCE GEORGES COUNTY, MARYLAND.
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 4A.
W75-04754

PLANNING FOR WATER QUALITY IN THE BEAR RIVER SYSTEM IN THE STATE OF UTAH.
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 5G.
W75-04757

AMENDING THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969, TO PROVIDE FOR A NATIONAL ENVIRONMENTAL DATA SYSTEM.
Washington D.C., Committee on Interior and Insular Affairs (U. S. Senate).
For primary bibliographic entry see Field 6E.
W75-04785

FRONTAL MOTION IN THE ATMOSPHERE,
Tel-Aviv Univ. (Israel), Dept. of Mathematical Sciences.
For primary bibliographic entry see Field 2B.
W75-04792

SURFACE WATER DATA OF THE LLANO TEXAS REGION, PROJECT SANGUINE.
EDAW, Inc., San Francisco, Calif.
For primary bibliographic entry see Field 2E.
W75-04847

8. ENGINEERING WORKS

8A. Structures

FLOATING WAVE BARRIER,
W. W. Bowley.
U.S. Patent No 3,848,419, 5 p, 7 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 928, No 3, p 942, November 19, 1974.

Descriptors: *Shore protection, *Patents, *Barriers, *Waves(Water), Beaches, Ocean waves, Floats.
Identifiers: *Wave action, *Wave energy, *Kinetic energy, Floating barriers.

A floating wave barrier is comprised of at least one vessel having a top, walls and an open bottom which, when placed in water, has the open bottom submerged. The vessel has at least one plate attached to the outside surface of the vessel and extending around all or a major portion of the vessel periphery. The vessel or vessels, when placed in water, contain a gas and water. When placed in water, the vessels and plate members are fixed to prevent substantial movement in the horizontal direction but are free to move in a vertical direction within the wave with the vertical movement of the connected vessels and plate members being out of phase with each other. The wave barrier dampens the vertical velocity component of waves by generating reflected waves in a seaward direction to impinge upon incoming waves and by displacing water from a wave at its crest to an adjacent wave trough. A number of these barriers are arranged parallel to the shore being protected at varying distances from the shore so that a given portion of the wave contacts more than one barrier prior to reaching the shore. (Sinha-OEIS)
W75-04453

INFLATABLE BARRIERS FOR WATERCOURSES,
Pneumatiques, Caoutchouc Manufacture et Plastiques Kleber-Colombes (France). (assignee)
J. V. Ganzinotti.
U.S. Patent No 3,855,800, 4 p, 9 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 929, No 4, p 1419, December 24, 1974.

Descriptors: *Patents, *Erosion control, *Barriers, Rivers, Inland waterways.
Identifiers: *Inflatable barriers, *Watercourses.

An inflatable barrier is used for retaining water in a watercourse. It comprises at least one inflatable enclosure secured to an element anchored directly or indirectly in such watercourse and constructed in such a fashion as to prevent erosion. Means are provided for anchoring the enclosure in relation to the watercourse bed, and this means incorporates an anchoring strip of supple material such as rubber that is securable to the bed. This strip has a free extremity or edge porvided with one or more means for removably connecting the barrier to the strip. The anchoring strip may be secured to a rigid member arranged to be laid down in the soil of the bed of the watercourse and this rigid member may take the form of a block of masonry. Alternatively, the anchoring strip may be embedded in the soil of the bed of the watercourse by digging out a

transverse trench using the removed aggregates to form a temporary dam, laying the anchoring strip in the trench preferably at an angle of 45 deg to the plane of the bed, and then filling up the trench with the aggregates previously dug out, thus to secure the strip in relation to the soil of the bed. (Sinha-OEIS)
W75-04467

DESIGN, CONSTRUCTION AND LAUNCHING OF A SUBMARINE OUTFALL SEWER AT WHITSTABLE,
Whitstable Urban District Council(England).
For primary bibliographic entry see Field 5D.
W75-04536

DEVELOPMENT OF GUIDELINES FOR THE DESIGN OF SUBSURFACE DRAINAGE SYSTEMS FOR HIGHWAY PAVEMENT STRUCTURAL SECTIONS,
Cedergren/KOA, Long Beach, Calif.
H. R. Cedergren, J. A. Arman, and K. H. O'Brien.
Available from the National Technical Information Service Springfield, Va. 22161 as PB-231 173; $7.25 paper copy, $2.25 microfiche. Report No FHWA-RD-73-14, February 1973. 193 p, 27 fig, 6 tab, 23 ref. FH-11-7582.

Descriptors: *Drainage, *Highways, *Design, *Subsurface drainage, Drainage systems, Outlets, Pipes, Paving, Hydrology, Drainage effects, Subsurface waters, Surface waters, Subsurface drains, Drainage engineering, Analytical techniques, Cost-benefit analysis, Maintenance.
Identifiers: Collector drains, Open graded bases, Drainage layers.

Results were presented of interviews with State highway department personnel, field reconnaissance of pavements in 9 states, and 9 case studies of selected pavements in the Federal Highway Administration Regions. Problems with existing drainage design concepts and construction methods were pointed out, showing why many pavements are saturated with water for long periods of time each year. It was deduced that this saturation contributes to considerable shortening of pavement life. A new method of design was presented to take care of the infiltration of surface water. Inflow-outflow analyses and highway geometrics were included in a procedure utilizing a two-layer graded filter to rapidly remove any water entering the structural layers. (See also W75-04213) (Humphreys-ISWS)
W75-04809

8B. Hydraulics

AN EXPERIMENTAL STUDY OF THE FREE SURFACE EFFECT ON A BUOYANT JET,
General Dynamics Corp., Groton, Conn. Electric Boat Div.
B. S. Ryskiewich, and L. Hafetz.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-239 536, $5.25 in paper copy, $2.25 in microfiche. Report No U440-74-103, p 119, January 1975. 68 fig, 4 tab, 5 ref. OWRT C-4276(No 9045)(1).

Descriptors: *Thermal pollution, *Jets, *Buoyancy, *Turbulence, *Free surfaces, Powerplants, Temperature, Submergence, Design data, Path of pollutants.

The effect of the surface on a submerged, round, turbulent, buoyant jet has been investigated experimentally. The results show that the surface retards temperature reduction leaving the maximum surface temperature at a higher level than would normally occur from an unbounded jet. The effect is particularly apparent for horizontal jets and decreases as the jet angle increases. Jet discharge variables were taken over a broad range; namely, Froude number from 2 to 60.1, discharge angle from 0 deg to 90 deg, and submergence depth from 10 to 80 jet diameters. The discharge variables range covers most cases of practical interest and the results, presented in graphical form, provide valuable data which will enable a power plant diffuser designer to execute his design with confidence in the plume behavior and surface effect. The data will also be useful to the marine biologist and others concerned with the buoyant jet's ecological implications.
W75-04559

RIVER REGIME WITH SPECIAL REFERENCE TO RIVER NILE,
Assiut Univ. (Egypt).
For primary bibliographic entry see Field 2E.
W75-04706

BIFURCATION CHARACTERISTIC REYNOLDS NUMBER,
Alberta Univ., Edmonton.
C. M. Rodkiewicz.
Journal of Hydraulic Research, Vol 12, No 2, p 241-252, 1974. 9 fig, 1 tab, 3 ref.

Descriptors: *Flow separation, *Pipelines, *Pipe flow, *Reynolds number, *Laboratory tests, Networks, Hydraulic systems.
Identifiers: *Bifurcation flow systems, Noises, Blood flow phenomenon, Arterial junctions, Hydrogen bubble technique.

The experimental studies of the flow characteristics in the bifurcation, where a single cylindrical branch leaves the parent trunk, were presented. The range of the entrance Reynolds number varied from 2000 to 11,000. For most bifurcations, around entrance Reynolds number of 7000, an unusual drop in the ratio of the mass flow rate in the side branch to the flow rate in the main branch, R, takes place. This drop was followed by a peculiar local recovery in the R ratio, which may be linked to a change in pressure and consequently may be a contributing factor in the generation of noises within the variable flow piping hydraulic systems. (Bhowmik-ISWS)
W75-04715

CHANNEL FLOW DRIVEN BY A STATIONARY THERMAL SOURCE,
Massachusetts Inst. of Tech., Cambridge.
D. A. Salstein.
Tellus, Vol 26, No 6, p 638-651, 1974. 8 fig, 1 tab, 10 ref. NSF Grant GA-36021X.

Descriptors: Analysis, *Fluid mechanics, *Heat flow, *Channel flow, *Average flow, Momentum equation, Continuity equation, Energy equation, Velocity, Equations, Analytical techniques, Topography, Mathematical studies, Distribution, Reynolds number, Thermal pollution.
Identifiers: *Boundary conditions, *Rayleigh number, Periodic channel, Reynolds stress, Prandtl number, Grashof number, Perturbation technique.

Analytical methods were used to show that mean horizontal flow may be produced from a periodic distribution of stationary heat sources which are placed on a varying topographic surface. Past analyses and experiments of channel flows were reviewed. Conditions necessary for the production of mean horizontal flows were derived for several boundary conditions on the upper fluid surface. The heat balance, momentum flux, and velocity field of this fluid system were discussed for these boundary conditions. (Adams-ISWS)
W75-04793

AN ALTERNATIVE FORMULATION OF THE PROBLEM OF DENSITY JUMP,
Sargent and Lundy, Chicago, Ill.
S. C. Mehrotra.
Tellus, Vol 26, No 5, p 579-581, 1974. 1 fig, 2 ref. NSF Grant GA-31247.

Descriptors: Density, *Continuity equation, *Momentum equation, *Density currents, Froude number, Weirs, Analysis, Entrainment, Depth, Critical flow, *Hydraulic jump, Equations.
Identifiers: *Density jump, Differential equations.

An alternative formulation of the density jump problem was presented. The formulation was not restricted by the Boussinesq assumption and was thus more general than the original formulation of Wilkinson and Wood. A first order ordinary differential equation was obtained for the crest height of a controlling weir as a function of the depth of the flowing layer downstream of the transition. A boundary condition corresponding to the immiscible jump was applied. A closed form solution of the differential equation was found to be possible but an explicit expression of the solution was not presented. (Adams-ISWS)
W75-04797

SIMPLIFIED APPLICATION OF PALMER-BOWLUS FLOW METERS,
ENCIBRA South America, Sao Paulo (Brazil).
R. G. Ludwig, and J. D. Parkhurst.
Journal Water Pollution Control Federation, Vol 46, No 12, p 2764-2769, December 1974. 3 fig, 8 ref.

Descriptors: *Discharge coefficient, *Rating curves, *Flow measurement, *Open channel flow, Measurement, Calibrations, Critical flow, Conduits, Discharge(Water), Flumes, Instrumentation.
Identifiers: *Critical depth meters, *Palmer-Bowlus flumes.

Simplified procedures for determining the rating curves for Palmer-Bowlus type flumes were presented. Rating tables were given for two standardized trapezoidal throat Palmer-Bowlus flumes for use in circular conduits flowing partially full. Discharge coefficients for use in a simple rating equation were shown graphically for rectangular throat flumes in circular and rectangular conduits. (Adams-ISWS)
W75-04802

HYDRAULIC ANALYSIS OF WINNIPEG SUMP INLETS,
Manitoba Univ., Winnipeg. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-04804

DEVELOPMENT OF GUIDELINES FOR THE DESIGN OF SUBSURFACE DRAINAGE SYSTEMS FOR HIGHWAY PAVEMENT STRUCTURAL SECTIONS,
Cedergren/KOA, Long Beach, Calif.
For primary bibliographic entry see Field 8A.
W75-04809

8C. Hydraulic Machinery

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED CLINTON POWER STATION UNITS 1 AND 2, ILLINOIS POWER COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04395

FINAL ENVIRONMENTAL STATEMENT RELATED TO CONSTRUCTION OF RIVER BEND NUCLEAR POWER STATION, UNITS 1 AND 2, GULF STATES UTILITIES COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04396

FINAL ENVIRONMENTAL STATEMENT RELATED TO THE PROPOSED PILGRIM NUCLEAR POWER STATION UNIT 2 BOSTON EDISON COMPANY.
Directorate of Licensing (AEC), Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04397

SPECIAL METHODS OPEN STORM-BLOCKED PIPELINE.
Water and Sewage Works, Vol 121, No 8, p 60-61, August, 1974.

Descriptors: *Pipelines, *Sewage treatment, Equipment, Costs, Storm sewers, Pumping, Waste disposal, Treatment facilities, *Waste water treatment.
Identifiers: Pipe cleaning.

New techniques for cleaning storm-blocked sewer pipes were developed and implemented by the Robinson Pipe Cleaning Company, Canonsburg, Pennsylvania. Several miles of 42-inch main interceptor sewer line were disabled, in an area from western Baltimore suburbs to their sewage treatment plant, as a consequence of Tropical Storm Agnes. After damage to the line was repaired, a five-mile portion had to be cleaned, unseen debris removed, and hidden defects located. Specialized small equipment was used, including high-pressure jets, bucket pullout machines, augers, and trash pumps. Water was pumped through jet-equipped trucks at pressures of 1500 psi to break up bulk material. Trash pumps disposed of the slurry created. Heavier objects were handpicked from the line. Brick and brick-sized stone were bucketed through the line and removed through manholes. After final jetting and pumping to flush fine material, the pipes were checked visually, using miner's helmet lights and torches. The line was then functionally operative. These methods saved costs and time ranging up to 90 percent of those of replacing the pipe system. (Prague-FIRL)
W75-04808

8D. Soil Mechanics

STRESS-STRAIN RESPONSE FOR SAND,
Punjab Agricultural Univ., Ludhiana (India).
P. Basak, and S. P. Brahma.
Soil Science, Vol 118, No 6, p 358-364, December 1974. 8 fig, 6 ref.

Descriptors: *Sands, *Stress, *Strain, *Soil physical properties, Soil strength, Cohesionless soils, Shear strength, Poisson ratio, Hysteresis, Void ratio, Soil properties, Soil engineering, Laboratory tests.
Identifiers: Kalpi sand.

A three-parameter stress-strain equation was proposed and compared with the experimental stress-strain response of a uniform, subrounded sand. The fitting was found to be excellent up to the failure. With the help of relevant boundary conditions, the constants a, b, and n were expressed as a function of shear strength, initial tangent modulus, and failure strain. Experimental correlation was made between initial void ratio and normal stress with the parameters a, b, and n. (Sanderson-ISWS)
W75-04696

8G. Materials

UPDATING AGING SEWERS WITHOUT TRENCHING,
Cliffside Pipelayers, Scarborough (Ontario).
For primary bibliographic entry see Field 5D.
W75-04828

MORE THAN A MYRIAD.
For primary bibliographic entry see Field 5D.
W75-04829

TV INSPECTIONS SLASH SEWER COSTS $300 PER REPAIR,
St. Louis Metropolitan Sewer District, Mo.
For primary bibliographic entry see Field 5G.
W75-04830

8I. Fisheries Engineering

FRESHWATER JELLYFISH (CRASPEDACUSTA SOWERBYI) IN LAKE PATAGONIA, SOUTHERN ARIZONA,
Arizona Cooperative Fishery Unit, Tucson.
B. E. Kynard, and J. C. Tash.
Arizona Academy of Science, Journal, Vol 9, No 2, p 76-77, June 1974. 1 fig, 13 ref.

Descriptors: *Jelly fish, *Arizona, *Fish stocking, *Artificial lakes, Fish, Fisheries, Zooplankton.
Identifiers: Lake Patagonia(Ariz.).

Freshwater jellyfish were discovered in Lake Patagonia during September 1973, the first report of their presence in Arizona. The species was probably introduced into the lake with stocked fish. Feeding studies indicate that the medusae compete directly with young fish for zooplankton and could have a deleterious effect on the fisheries of the lake. Sixty-five medusae were collected at three sites in the lake, and measured. No search was made for polyps. (Mastic-Arizona)
W75-04386

9. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

PLANNING, MANAGEMENT AND ACCOUNTABILITY IN WATER RESOURCES RESEARCH,
Auburn Univ., Ala. Water Resources Research Inst.
For primary bibliographic entry see Field 6B.
W75-04439

TENTH ANNUAL REPORT, PROGRAM ACTIVITIES, JULY 1, 1973 - JUNE 30, 1974.
Maryland Univ., College Park. Water Resources Research Center.
For primary bibliographic entry see Field 9D.
W75-04654

9D. Grants, Contracts, and Research Act Allotments

TENTH ANNUAL REPORT, PROGRAM ACTIVITIES, JULY 1, 1973 - JUNE 30, 1974.
Maryland Univ., College Park. Water Resources Research Center.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-239 686, $4.75 in paper copy, $2.25 in microfiche. 1974. 79 p, 1 fig, 10 tab. OWRT A-999-MD(10).

Descriptors: *Water Resources Research Act, *Maryland, *Water Resources Institute, *Universities, Training, Grants, Projects, Water pollution, Water quality, Estuaries, Waste disposal, Waste water disposal, Waste water treatment, Farm wastes.

Research and other activities underway at the Maryland Water Resources Research Center during Fiscal Year 1974 (July 1, 1973 - June 30, 1974) are described, and current and anticipated water problems are identified. Competitive multiple uses of water continue to generate the major water resource problems. The Research Center's largest project pertains to the potential impact on soils, crops, and other vegetation of emissions of a large, natural draft, cooling tower that uses brackish water. Other problem areas being studied include treatment and disposal of farm wastes, urban storm runoff, chlorinated sewage effluents, heavy metals and minerals in Chesapeake Bay sediments, water pollution effects on aquatic life, and contributions of tidal marshlands to food chains in estuaries. (Humphreys-ISWS)
W75-04654

10. SCIENTIFIC AND TECHNICAL INFORMATION

10B. Reference and Retrieval

INTERNATIONAL ENVIRONMENTAL BIBLIOGRAPHIES--ENVIRONMENTAL LEGISLATION--NORTH AMERICA.
Environmental Protection Agency, Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-04594

ACID MINE WATER, A BIBLIOGRAPHY,
Office of Water Research and Technology, Washington, D.C.
For primary bibliographic entry see Field 5G.
W75-04625

10C. Secondary Publication And Distribution

DIRECTORY OF ENVIRONMENTAL LIFE SCIENTISTS,
Institute of Ecology, Madison, Wis.
For primary bibliographic entry see Field 6G.
W75-04468

10D. Specialized Information Center Services

DIRECTORY OF ENVIRONMENTAL LIFE SCIENTISTS,
Institute of Ecology, Madison, Wis.
For primary bibliographic entry see Field 6G.
W75-04468

10F. Preparation Of Reviews

1971 ANNUAL REVIEW OF LITERATURE. WASTE WATER TREATMENT PHYSICAL AND CHEMICAL METHODS,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5D.
W75-04437

CHEMICALS AND ALLIED PRODUCTS, (LITERATURE REVIEW),
Union Carbide Corp., South Charleston, W. Va.
For primary bibliographic entry see Field 5G.
W75-04474

ECONOMICS, (LITERATURE REVIEW),
Georgia Inst. of Tech., Atlanta, Ga. Envrionmental Resources Center.
For primary bibliographic entry see Field 5G.
W75-04846

Field 10—SCIENTIFIC AND TECHNICAL INFORMATION

Group 10F—Preparation Of Reviews

EFFECTS OF POLLUTION ON FRESHWATER FISH, (LITERATURE REVIEW),
National Water Quality Lab., Duluth, Minn.
For primary bibliographic entry see Field 5C.
W75-04848

OXYGEN SAG AND STREAM PURIFICATION, (LITERATURE REVIEW),
Georgia Dept. of Natural Resources, Atlanta.
For primary bibliographic entry see Field 05B.
W75-04849

SUBJECT INDEX

2

Aquatic Plant Control Program, State of Florida (Final Environmental Impact Statement).
W75-04598 5G

ABSOLUTE LIABILITY
The Disposal of Radioactive Wastes Into the Sea: Some International Legal Considerations,
W75-04769 6E

ACCOUNTABILITY (RESPONSIBILITY)
Planning, Management and Accountability in Water Resources Research,
W75-04439 6B

ACETATE
Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. I. Field Observations,
W75-04469 5C

Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. II. Inhibition Experiments,
W75-04470 5C

ACETYLENE REDUCTION
Nitrogen Fixation (Acetylene Reduction) by Phytoplankton in Green Bay, Lake Michigan, in Relation to Nutrient Concentrations,
W75-04498 5C

ACID-IRON WASTES
Acid-Iron Waste as a Factor Affecting the Distribution and Abundance of Zooplankton in the New York Bight: II. Spatial Variations in the Field and Implications for Monitoring Studies,
W75-04574 5B

ACID MINE WATER
Acid Mine Water, A Bibliography,
W75-04625 5G

ACIDIC WATERS
Identification and Evaluation of Water Tracers Amenable to Post-Sampling Neutron Activation Analysis,
W75-04355 5A

ACTINOMYCES
Microbiological Production of Geosmin,
W75-04561 5D

ACTIVATED CARBON
Turbidity Removal Using Polymers and Activated Carbon,
W75-04820 5F

ACTIVATED SLUDGE
Bacterial Zoogloea Formation,
W75-04572 5D

Tertiary Treatment: The Wrong Solution to a Non-Problem,
W75-04811 5D

Bubble Size and Contact Time in Diffused Aeration Systems,
W75-04813 5D

Applicability of Control Strategies to the Activated Sludge Wastewater Treatment Process,
W75-04822 5D

Activated Sludge Bulking (In Japanese),
W75-04824 5D

ADIRONDACKS (N.Y.)
An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

ADJUDICATION PROCEDURE
Zahn, ET AL. V. International Paper Co. (Class Action Seeking Damages from Discharges),
W75-04588 6E

ADMINISTRATION
High-Level Radioactive Waste Management Alternatives - Section 1-3: Summary, Background and Data Base, and Evaluation Methodology.
W75-04403 5D

Soil Conservation--Administration of Departments and Conservancy Districts.
W75-04773 6E

ADMINISTRATIVE AGENCIES
An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

Water Quality Control--The Role of the Interstate Agency,
W75-04596 5G

Bill to Establish the Potomac National River in the States of Maryland, Virginia, West Virginia, and the District of Columbia and for Other Purposes.
W75-04772 6E

Waterworks Department in Certain Cities.
W75-04774 6E

ADMINISTRATIVE DECISIONS
EPA to Issue Impact Statements on Some Regulatory Actions,
W75-04586 5G

ADMINISTRATIVE REGULATION
Amelioration of Effects of Oil Spills.
W75-04779 5G

Incorporated Village of Cornwall V. Environmental Protection Administration of the City of New York (Village Seeking Annulment of Withdrawal of Conditional Approval for Interconnection with Aqueduct from Upstate Watershed and Issuance of Final Approval of Application).
W75-04781 6E

ADMINISTRATIVE REGULATIONS
Water Quality Management Basin Plans Regulations Adopted,
W75-04584 5G

EPA Efforts to End Feedlot Manure Pollution Criticized,
W75-04585 5G

EPA to Issue Impact Statements on Some Regulatory Actions,
W75-04586 5G

Permit Provisions Adopted for Ocean Water Activity,
W75-04587 5G

Authorization for Secretary of Interior to Acquire Additional Wetlands.
W75-04651 6E

A Bill to Assure Safe Drinking Water.
W75-04652 6E

Soil Conservation--Administration of Departments and Conservancy Districts.
W75-04773 6E

Union of Concerned Scientists V. Atomic Energy Comm'n. (Review of Orders of AEC Licensing Nuclear Powerplant).
W75-04775 6E

In Re Highway US-24, in Bloomfield Township, Oakland County (Highway Condemnation Proceeding).
W75-04776 6E

Water Pollution--Liquid Wastes (As Amended).
W75-04777 5G

Bergen County Sewer Authority V. Hackensack Meadowlands Development Commission (Seeking Declaratory Judgment that Plaintiff not Subject to Land Use Regulations of Defendant in Constructing Addition to Sewage Plant).
W75-04780 6E

Authorizing the Secretary of the Interior to Construct, Operate, and Maintain the East Greenacres Unit, Rathdrum Prairie Project, Idaho, and for Other Purposes.
W75-04787 6E

ADOPTION OF PRACTICES
Zahn, ET AL. V. International Paper Co. (Class Action Seeking Damages from Discharges),
W75-04588 6E

Authorization for Secretary of Interior to Acquire Additional Wetlands.
W75-04651 6E

The Marine Environment and Toxic Substances (When was the Last Time You had a Good Swordfish Steak),
W75-04768 6E

Bill to Establish the Potomac National River in the States of Maryland, Virginia, West Virginia, and the District of Columbia and for Other Purposes.
W75-04772 6E

Soil Conservation--Administration of Departments and Conservancy Districts.
W75-04773 6E

Waterworks Department in Certain Cities.
W75-04774 6E

ADSORPTION
Electrochemical Process for Nutrient Removal,
W75-04446 5D

Turbidity Removal Using Polymers and Activated Carbon,
W75-04820 5F

AEOLIAN SOILS
Stabilization of Aeolian Lands in Saudi Arabia's Al Hasa Oasis,
W75-04512 3C

AERATED LAGOONS
Bubble Size and Contact Time in Diffused Aeration Systems,
W75-04813 5D

AERATION
Sewage Treatment System,
W75-04456 5D

Laboratory Studies on Feedlot Runoff,
W75-04653 5D

AERATION

Ammonia Desorption by Diffused Aeration,
W75-04812 5D

Bubble Size and Contact Time in Diffused Aeration Systems,
W75-04813 5D

Environment, Energy Costs Suggest Oxygen Activated Sludge as Wastewater Treatment Approach,
W75-04827 5D

Relative Influence of Moisture-Aeration and Nutrients on Vegetation and Black Spruce Growth in Northern Ontario,
W75-04837 2I

Mechanical Aeration of a Waste Disposal Manure Pit,
W75-04841 5D

Oxygen Sag and Stream Purification, (Literature Review),
W75-04849 5B

AERIAL PHOTOGRAPHY

Water Quality by Photographic Analysis,
W75-04814 5A

AEROBIC TREATMENT

New Aerobic Process Turns Waste to Nutrients,
W75-04619 5D

In-The-Building Oxidation Ditches for Livestock Wastes,
W75-04643 5D

Bubble Size and Contact Time in Diffused Aeration Systems,
W75-04813 5D

AESTHETICS

Bill to Establish the Potomac National River in the States of Maryland, Virginia, West Virginia, and the District of Columbia and for Other Purposes.
W75-04772 6E

AGE

Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

AGRICULTURAL CHEMICALS

Ecological History of DDT in Arizona,
W75-04387 5C

AGRICULTURAL RUNOFF

Surface Water Quality is Influenced by Agricultural Practices,
W75-04548 5B

AGRICULTURE

Drainage for Agriculture,
W75-04537 3F

AIR CIRCULATION

Maximum Daily Precipitation in Gorski Kotar and Lika (Yugoslavia) in Relation to the Overflying Air-Stream,
W75-04666 2B

AIR POLLUTION

Supersonic Aircraft and the Ozone Layer,
W75-04393 5A

Retrievable Surface Storage Facility, Alternative Concepts Engineering Studies.
W75-04401 5D

Development of an Air Pollution Model for the San Francisco Bay Area. Third Semi annual Report to the National Science Foundation.
W75-04421 5A

Solution of Simultaneous Partial Differential Equations: An Extension of PDEL,
W75-04539 6A

Enforcement Economics in Air Pollution Control,
W75-04569 5G

AIR POLLUTION CONTROL

Enforcement Economics in Air Pollution Control,
W75-04569 5G

AITKEN NUCLEI

Diurnal Variations in Cloud Condensation Nuclei,
W75-04711 2B

ALABAMA

Irrigation, Row width, and Plant Population in Relation to Growth Characteristics of Two Soybean Varieties,
W75-04369 3F

Hendrix, Et Al. V. Creel, Et Al. (Action for Injunction to Compel Municipal Corporation to Clear and Maintain Ditch).
W75-04782 6E

Will Current Research Answer Today's Problems at the Sanitary Landfill.,
W75-04800 5B

ALAMANCE COUNTY (N.C.)

Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

ALBEDO

Simple Albedo Feedback Models of the Icecaps,
W75-04794 2C

ALGAE

A New Technique for the Study of Epiphytic Algae,
W75-04499 5C

Sewage-Grown Algae as a Feedstuff for Chicks,
W75-04618 5D

Methods of Removing Nitrates From Water,
W75-04626 5D

ALGAE (INTERTIDAL)

Comparative Photosynthetic Capacities of Intertidal Algae Under Exposed and Submerged Conditions,
W75-04524 5C

ALGAE STRIPPING

Methods of Removing Nitrates From Water,
W75-04626 5D

ALGORITHMS

Solution of Simultaneous Partial Differential Equations: An Extension of PDEL,
W75-04539 6A

An Operational Framework for Coastal Zone Management Planning.
W75-04558 6A

ALLIGATOR WEEDS

An Ecological Study of a Baldcypress Swamp in St. Charles Parish, Louisiana,
W75-04364 2H

ALTERNATIVE COSTS

Enforcement Economics in Air Pollution Control,
W75-04569 5G

ALTERNATIVE PLANNING

High-Level Radioactive Waste Management Alternatives.
W75-04402 5D

High-Level Radioactive Waste Management Alternatives - Section 1-3: Summary, Background and Data Base, and Evaluation Methodology.
W75-04403 5D

High-Level Radioactive Waste Management Alternatives - Section 4: Geologic Disposal.
W75-04404 5D

High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

High-Level Radioactivity Waste Management Alternatives - Section 8: Extraterrestrii Disposal,
W75-04408 5D

High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

An Examination of Alternative Methods for Employing Booms to Contain Oil Spills in Navy Harbors,
W75-04720 5G

Engineering a Victory for the Environment: A Citizen's Guide to the U.S. Army Corps of Engineers,
W75-04755 6G

ALTERNATIVE WATER USE

Retrievable Surface Storage Facility, Alternative Concepts Engineering Studies.
W75-04401 5D

ALUMINUM

Sewage-Grown Algae as a Feedstuff for Chicks,
W75-04618 5D

ALUMINUM SMELTING WASTES

Fluoride Concentrations in Two Pacific Coast Inlets-An Indication of Industrial Contamination,
W75-04473 5B

AMERICAN SAMOA

Jurisdiction of Submerged Lands--Guam, the Virgin Islands and American Samoa.
W75-04783 6E

AMMONIA

Nutrient Enrichment of Groundwater from Septic Tank Disposal Systems,
W75-04758 5C

AMMONIA (ANHYDROUS)

Effectiveness of Two Nitrification Inhibitors for Anhydrous Ammonia Under Irrigated and Dryland Conditions,
W75-04425 5G

AMMONIA DESORPTION

Ammonia Desorption by Diffused Aeration,
W75-04812 5D

AMPHIPODS
Distribution and Ecology of Amphipodes (Especially Gammarides) in the Basin and Estuary of the Dourduff River (Brittany, France), (In French),
W75-04488 2I

ANALYTICAL TECHNIQUES
Identification and Evaluation of Water Tracers Amenable to Post-Sampling Neutron Activation Analysis,
W75-04355 5A

Pacific Northwest Laboratory Annual Report for 1973 to the USAEC Division of Biomedical and Environmental Research Part 4. Physical and Analytical Sciences,
W75-04410 5C

Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

A New Technique for the Study of Epiphytic Algae,
W75-04499 5C

Computerized Calculation of Areal Precipitation and Its Accuracy,
W75-04688 7C

Measurement of Hydrocarbons in Water: Application to Cases of Surface Water Pollution,
W75-04709 5A

ANTARCTIC
High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

ANTARCTIC OCEAN
Torulopsis Austromarina Sp. Nov. A Yeast Isolated from the Antartic Ocean,
W75-04436 5A

ANTHROPOGENIC FLUORIDE
Fluoride Concentrations in Two Pacific Coast Inlets-An Indication of Industrial Contamination,
W75-04473 5B

APPLICATION RATES
Manure Application Guidelines for the Pacific Northwest,
W75-04631 5G

AQUATIC BACTERIA
Mercury in Aquatic Systems: Methylation, Oxidation-Reduction, and Bioaccumulation,
W75-04570 5B

AQUATIC ENVIRONMENT
The Effects of the Interaction of Outboard Motors with the Aquatic Environment: A Review,
W75-04816 5C

AQUATIC LIFE
Aquatic Plant Control.
W75-04599 6E

AQUATIC WEED CONTROL
Aquatic Plant Control Program, State of Florida (Final Environmental Impact Statement).
W75-04598 5G

Aquatic Plant Control.
W75-04599 6E

AQUIFERS
Parameter Identification in Distributed Systems Using a Digital Simulation Language: An Extension of PDEL,
W75-04540 6A

Groundwater Pumpage in Northern Illinois, 1960-1970,
W75-04727 4B

AREAL
Computerized Calculation of Areal Precipitation and Its Accuracy,
W75-04688 7C

Estimating Areal Rainfall by Fitting Surfaces to Irregularly Spaced Data,
W75-04693 7C

AREAL HYDROGEOLOGY
Areal Rainfall Analysis by Computer,
W75-04687 7C

ARENICOLA-MARINE
The Effect of Salinity and Ionic Equilibrium on Contamination of Arenicola Marina L. (Annelida: Polychaeta) by Cesium-137, (In French),
W75-04489 5C

ARID CLIMATES
Phenological Events and Their Environmental Triggers in Mojave Desert Ecosystems,
W75-04385 2I

ARID LANDS
Range Plant Yield and Species Relationships in Natural and Partially Controlled Environments,
W75-04378 2I

Water Uptake by Seeds as Affected by Water Stress, Capillary Conductivity, and Seed-Soil Water Contact. I. Experimental Study and, II. Analysis of Experimental Data,
W75-04381 2I

More Water for Arid Lands, Promising Technologies and Research Opportunities.
W75-04508 3B

Environmental Consequences of Land Use in Arid and Semiarid Areas,
W75-04514 6G

The Role of Water and Land Resources in Alleviating Malnutrition and Hunger in Arid Regions,
W75-04603 6B

Water Rights and Assessments, (Proposals Involving Antarctic Icebergs for the Colorado River Basin, California, Mexico and Other Arid Lands),
W75-04610 3B

ARIZONA
Response of Herbaceous Vegetation to Felling of Alligator Juniper,
W75-04376 2I

Freshwater Jellyfish (Craspedacusta Sowerbyi) in Lake Patagonia, Southern Arizona,
W75-04386 8I

Ecological History of DDT in Arizona,
W75-04387 5C

Slats in the Southwest,
W75-04621 5D

Isotopic and Chemical Considerations in Radiocarbon Dating of Groundwater Within the Arid Tucson Basin, Arizona,
W75-04647 7B

ARKANSAS
Arkansas State Game and Fish Comm'n. v. Eubank (Suit Enjoin Proposed Partial Fish Kill).
W75-04844 6E

ARMY CORPS OF ENGINEERS
Engineering a Victory for the Environment: A Citizen's Guide to the U.S. Army Corps of Engineers,
W75-04755 6G

ARROYOS
The Influence of Soil Water Potential on the Perennial Vegetation of a Desert Arroyo,
W75-04365 2I

ARTIFICIAL HEART RECIPIENTS
Population Radiation Exposure,
W75-04420 5C

ARTIFICIAL LAKES
Freshwater Jellyfish (Craspedacusta Sowerbyi) in Lake Patagonia, Southern Arizona,
W75-04386 8I

ARTIFICIAL PRECIPITATION
Atmospheric Water Resources Management Program - Bridger Range Cloud Seeding Experiment,
W75-04721 3B

ASBESTIFORM AMPHIBOLE MINERALS
Asbestiform Amphibole Minerals: Detection and Measurement of High Concentrations in Municipal Water Supplies,
W75-04818 5A

ASBESTOS
Asbestiform Amphibole Minerals: Detection and Measurement of High Concentrations in Municipal Water Supplies,
W75-04818 5A

ASSAY
Radiation Dosimetry,
W75-04414 5C

ATLANTIC OCEAN
Rotating Hydraulics of Strait and Sill Flows,
W75-04716 2L

ATMOSPHERE
The Problem of Calculating Cloud Cover in Calculations of Long Wave Radiational Characteristics of the Atmosphere,
W75-04740 2B

Frontal Motion in the Atmosphere,
W75-04792 2B

ATMOSPHERIC MOISTURE
Atmospheric Moisture Parameterization,
W75-04724 2B

ATTITUDES
The Brandywine: Five Years After,
W75-04360 6B

AUSTRALIA
Living City, (Melbourne, Australia, Review of Operations, 1972-73).
W75-04762 3D

More Than a Myriad.
W75-04829 5D

AUSTRIA (ALPS)
Statistical Considerations About Snow Conditions in the Austrian Alps,
W75-04667 2C

AUTOMATION
Computer Control of Chemical Addition at a Water-Treatment Plant,
W75-04535 5F

Routine Surveillance Alternatives for Water Quality Management,
W75-04803 5A

AVERAGE FLOW
Channel Flow Driven by a Stationary Thermal Source,
W75-04793 8B

BACTERIA
Biologic Detection and Control of Water Pollution,
W75-04447 5C

Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. I. Field Observations,
W75-04469 5C

Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. II. Inhibition Experiments,
W75-04470 5C

Bacterial Zoogloea Formation,
W75-04572 5D

Methods of Removing Nitrates From Water,
W75-04626 5D

BALDCYPRESS
An Ecological Study of a Baldcypress Swamp in St. Charles Parish, Louisiana,
W75-04364 2H

BARGES
A Regional Model of the Future Demand For Transportation: The Case of Barge Transportation,
W75-04520 6A

BARLEY
Effect of Leaf Area Reduction on the Water Requirement of Barley (Hordeum Vulgare L.),
W75-04511 2I

BARRIERS
Floating Wave Barrier,
W75-04453 8A

Inflatable Barriers for Watercourses,
W75-04467 8A

BASALTIC AQUIFERS
Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

BAYTOWN (TEX)
Flood Plain Information -- Goose Creek, Baytown, Texas.
W75-04750 4A

BEAR RIVER (UTAH)
Planning for Water Quality in the Bear River System in the State of Utah.
W75-04757 5G

BEDS UNDER WATER
The International Seabed Regime: Proposals and Prospects for Realization,
W75-04767 6E

BENEFICIAL USE
Nuclear Techniques in Medical Science,
W75-04412 5A

Population Radiation Exposure,
W75-04420 5C

BENEFITS
Differences Between Planned and Actual Costs and Benefits in Small Watershed Development,
W75-04433 4D

BENTHIC COMMUNITY
Benthic Community Respiration Near the Woods Hole Sewage Outfall,
W75-04503 5C

BENTHOS
Some Effects of Spring Snowmelt Runoff on Aquatic Invertebrate Populations in a High Moutain Stream,
W75-04450 2I

BIBLIOGRAPHIES
1971 Annual Review of Literature. Waste Water Treatment Physical and Chemical Methods,
W75-04437 5D

Chemicals and Allied Products, (Literature Review),
W75-04474 5G

International Environmental Bibliographies--Environmental Legislation--North America.
W75-04594 6G

Acid Mine Water, A Bibliography,
W75-04625 5G

Economics, (Literature Review),
W75-04846 5G

Oxygen Sag and Stream Purification, (Literature Review),
W75-04849 5B

BIBLIOGRAPHY
Effects of Pollution on Freshwater Fish, (Literature Review),
W75-04848 5C

BIFURCATION FLOW SYSTEMS
Bifurcation Characteristic Reynolds Number,
W75-04715 8B

BIG CREEK (KAN)
Flood Plain Information: Big Creek, Chetolah Creek and Lincoln Draw, Hays, Kansas.
W75-04749 4A

BIOCHEMICAL OXYGEN DEMAND
Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

Surface Water Quality is Influenced by Agricultural Practices,
W75-04548 5B

BIOCHEMISTRY
Effects of Pollution on Freshwater Fish, (Literature Review),
W75-04848 5C

BIOCONTROL
Biologic Detection and Control of Water Pollution,
W75-04447 5C

BIODEGRADATION
Biodegradability of a Carboxymethyloxysuccinate Detergent Builder,
W75-04426 5D

Polyvinyl Alcohol as a Stabilizer of Surface Soil,
W75-04607 2G

BIOINDICATORS
Environmental Requirements and Pollution Tolerance of Freshwater Diatoms,
W75-04563 5C

BIOLOGICAL CONTROL
Radiation Biophysics,
W75-04415 5C

BIOLOGICAL PROPERTIES
Analyzing Biological Properties of Wastes,
W75-04842 5A

BIOLOGICAL TREATMENT
Biodegradability of a Carboxymethyloxysuccinate Detergent Builder,
W75-04426 5D

Apparatus for the Filtration and Biological Purification of Contaminated Water,
W75-04454 5D

Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

BIOLOGY
Nuclear Techniques in Medical Science,
W75-04412 5A

Radiation Physics,
W75-04413 5C

Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

BIONOMY
Remarks on Bionomy of Family Cyprinodontidae (Pisces) with Respect to Dependency of Development of Embryos of Roloffia Foloffi (Ahl., 1938) on the Hardness of the Water, (In German),
W75-04494 2I

BLACK SPRUCE
Relative Influence of Moisture-Aeration and Nutrients on Vegetation and Black Spruce Growth in Northern Ontario,
W75-04837 2I

BLACK WATER
Method for Treatment of Coal Washery Waters,
W75-04463 5D

BLUE RIVER (KAN)
Flood Plain Information: Blue River and Tributaries, Johnson County, Kansas.
W75-04744 4A

BOILING WATER REACTORS
Final Environmental Statement Related to the Proposed Clinton Power Station Units 1 and 2, Illinois Power Company.
W75-04395 5G

Final Environmental Statement Related to Construction of River Bend Nuclear Power Station, Units 1 and 2, Gulf States Utilities Company.
W75-04396 5G

BOULDER CANYON PROJECT ACT
Procedural Methods for Implementing Colorado River Water Conservation Measures.
W75-04778 6E

BOUNDARIES (PROPERTY)
African Attitudes Toward the Law of the Sea,
W75-04771 6E

BOUNDARY CONDITIONS
Channel Flow Driven by a Stationary Thermal Source,
W75-04793 8B

BRACHISH WATER
Influence of Freshwater Dulution on Dynamics of Populations of Builder Crustaceans from Lagoon of Biguglia, Corsica (Corophium Insidiosum C., Tanais Cavolinii M.E., Erichthonius Brasiliensis D.), (In French),
W75-04490 2H

BRACKISH WATER
The Occurrence of Young Sardinella Aurita in the Brackish Water of the Lagoons of Cananeia (Brazil), (In German),
W75-04492 2L

BRACKISH-WATER FISH
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

BRANDYWINE WATERSHED (PA)
The Brandywine: Five Years After,
W75-04360 6B

BRASSICA-NIGRA
Dominance of California Annual Grasslands by Brassica Nigra,
W75-04435 2I

BRAZIL
Relative Rates of Flow of the Negro and Solimoes Rivers (Determined) Through O18 Concentrations, (In Porteguese),
W75-04495 2E

BRAZIL (LAGOONS OF CANANEIA)
The Occurrence of Young Sardinella Aurita in the Brackish Water of the Lagoons of Cananeia (Brazil), (In German),
W75-04492 2L

BREAM
Note on Growth of the Bream, Abramis Brama (Linnaeus, 1758) in the Orlik Valley Water Reservoir,
W75-04493 2I

BREEDING
Some Effects of Spring Snowmelt Runoff on Aquatic Invertebrate Populations in a High Moutain Stream,
W75-04450 2I

BRIDGER RANGE (MONT)
Atmospheric Water Resources Management Program - Bridger Range Cloud Seeding Experiment,
W75-04721 3B

BRINES
Geothermal Wells in Imperial Valley, California: Desalting Potentials, Historical Development, and A Selected Bibliography,
W75-04423 3A

Utilization of the Earth's Natural Heating System to Desalt Geothermal Brines for Augmentation of the Colorado River System,
W75-04430 3A

BUBBLES
Bubble Size and Contact Time in Diffused Aeration Systems,
W75-04813 5D

BULK DENSITY
Feedlot Waste Effects on Soil Conditions and Water Evaporation,
W75-04699 5B

Activated Sludge Bulking (In Japanese),
W75-04824 5D

BULKING
Activated Sludge Bulking (In Japanese),
W75-04824 5D

BUOYANCY
An Experimental Study of the Free Surface Effect on a Buoyant Jet,
W75-04559 8B

BURNING
Wood Boring Insect Infestations in Relation to Mesquite Control Practices,
W75-04380 3B

Mechanism of Fire-Induced Water Repellency in Soil,
W75-04515 2G

BUYUK MENDERES RIVER BASIN (TURKEY)
Prediction of Drainage Requirements -- Buyuk Menderes River Basin, Turkey,
W75-04534 4A

CALCIUM
Deposition of Water and Cations on Artificial Foliar Collectors in Fir Krummholz of New England Mountains,
W75-04471 2K

CALCIUM CHLORIDE
Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

CALIFORNIA
Development of an Air Pollution Model for the San Francisco Bay Area. Third Semi annual Report to the National Science Foundation.
W75-04421 5A

Geothermal Wells in Imperial Valley, California: Desalting Potentials, Historical Development, and A Selected Bibliography,
W75-04423 3A

Utilization of the Earth's Natural Heating System to Desalt Geothermal Brines for Augmentation of the Colorado River System,
W75-04430 3A

Dominance of California Annual Grasslands by Brassica Nigra,
W75-04435 2I

Numerical Simulation of Unsteady Flow Hydraulics of Truckee River,
W75-04444 6A

The Social Redemption of Pure Garbage,
W75-04553 5D

Methods of Removing Nitrates From Water,
W75-04626 5D

Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

Offshore Oil Drilling at Santa Barbara, Part 1,
W75-04784 6E

Trace Metals in Wastewater Effluents,
W75-04806 5B

CANADA
Water: Canadian Needs and Resources,
W75-04359 6B

Fluoride Concentrations in Two Pacific Coast Inlets-An Indication of Industrial Contamination,
W75-04473 5B

The Distribution of Precipitation in Some Mountainous Canadian Watersheds,
W75-04671 2B

The Urban Region Plan: Saint John, (New Brunswick), Urban Region Impact Study.
W75-04756 6B

A Compendium of Information, (The Metropolitan Toronto and Region Conservation Authority).
W75-04760 3D

Hydraulic Analysis of Winnipeg Sump Inlets,
W75-04804 5D

Updating Aging Sewers Without Trenching,
W75-04828 5D

CANADA (ONTARIO)
Relative Influence of Moisture-Aeration and Nutrients on Vegetation and Black Spruce Growth in Northern Ontario,
W75-04837 2I

CANALS
Railroad and Canal Companies--Eminent Domain (As Amended),
W75-04580 6E

River Regime With Special Reference to River Nile,
W75-04706 2E

CANNERIES
Dry Caustic Peeling of Clingstone Peaches on a Commercial Scale,
W75-04564 5D

CAPE COD BAY (MASS)
Final Environmental Statement Related to the Proposed Pilgrim Nuclear Power Station Unit 2 Boston Edison Company.
W75-04397 5G

CARBON-13
Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

CARBON ADSORPTION METHOD
Organic Compounds Entering Ground Water from a Landfill,
W75-04573 5B

CARBON DIOXIDE
Changes in Transpiration, Net Carbon Dioxide Assimilation and Leaf Water Potential Resulting from Application of Hydrostatic Pressure to Roots of Intact Pepper Plants,
W75-04399 3F

CARBON RADIOISOTOPES
Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

CARBON TETRACHLORIDE EXTRACTION
Measurement of Hydrocarbons in Water: Application to Cases of Surface Water Pollution,
W75-04709 5A

CARBONATE AQUIFERS
Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

CARBONATE ROCKS
Controls on the Quality Variations of Some Carbonate Spring Waters,
W75-04710 2F

CARIBBEAN SEA
Production Ecology of Two Caribean Marine Ecosystems: I. Physical Environment and Fauna,
W75-04479 5C

CATIONS
Deposition of Water and Cations on Artificial Foliar Collectors in Fir Krummholz of New England Mountains,
W75-04471 2K

CATTLE
Fast Fluch System,
W75-04622 5D

Dewatering Bovine Animal Manure,
W75-04627 5D

EPA Preparing to 'Railroad' Through New Pollution Rules Covering Cattle Feedlots,
W75-04639 5G

Effects of Cattle Feedlot Manure on Crop Yields and Soil Conditions,
W75-04833 5D

Water Quality of Storm Runoff from a Texas Beef Feedlot,
W75-04843 5B

CEDAR BAYOU (TEX)
Flood Plain Information - Cedar Bayou, Houston Metropolitan Area, Texas.
W75-04748 4A

CENTRIFUGATION
Trace Metals in Wastewater Effluents,
W75-04806 5B

CESIUM-137
The Effect of Salinity and Ionic Equilibrium on Contamination of Arenicola Marina L. (Annelida: Polychaeta) by Cesium-137, (In French),
W75-04489 5C

CESSPOOLS
Subsurface Sewage Disposal and Contamination of Ground Water in East Portland, Oregon,
W75-04798 5B

CHANNEL FLOW
Channel Flow Driven by a Stationary Thermal Source,
W75-04793 8B

CHANNEL MORPHOLOGY
River Regime With Special Reference to River Nile,
W75-04706 2E

CHEMICAL ANALYSIS
Identification and Evaluation of Water Tracers Amenable to Post-Sampling Neutron Activation Analysis,
W75-04355 5A

Isotopic and Chemical Considerations in Radiocarbon Dating of Groundwater Within the Arid Tucson Basin, Arizona,
W75-04647 7B

CHEMICAL AVOIDANCE
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

CHEMICAL OXYGEN DEMAND
A Study of the Waste Wash Water from Egg Washing Machines,
W75-04475 5B

CHEMICAL PROPERTIES
Isotopic and Chemical Considerations in Radiocarbon Dating of Groundwater Within the Arid Tucson Basin, Arizona,
W75-04647 7B

CHEMICAL TREATMENT
Water Clarification with Nitrogen-Heterocyclic Phosphonic Acids,
W75-04457 5D

Removal of Boron From Water,
W75-04462 5D

CHEMICAL WASTES
Laboratory Study of Continuous Electrooxidation of Dilute Cyanide Wastes,
W75-04719 5D

CHEMICALS
Chemicals and Allied Products, (Literature Review),
W75-04474 5G

Computer Control of Chemical Addition at a Water-Treatment Plant,
W75-04535 5F

CHESAPEAKE (VA)
Flood Plain Information--Coastal Flooding, City of Chesapeake, Virginia.
W75-04753 4A

CHETOLAH CREEK (KAN)
Flood Plain Information: Big Creek, Chetolah Creek and Lincoln Draw, Hays, Kansas.
W75-04749 4A

CHIRONOMID PUPAL EXUVIAE
The Use of Chironomid Pupal Exuviae for Characterizing Streams,
W75-04371 5B

CHLORINATION
Electrochemical Process for Nutrient Removal,
W75-04446 5D

Method for Electrosanitizing Waste Water,
W75-04464 5D

CHLORINE
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

CIRCULATION
Rainfall Patterns and General Atmospheric Circulation,
W75-04513 2B

CIRCULATORY SYSTEM
Recipient Radiation Exposure - Circulatory Support Systems,
W75-04419 5C

CITIZEN PARTICIPATION IN WATER RESOURCE PLANNING
Engineering a Victory for the Environment: A Citizen's Guide to the U.S. Army Corps of Engineers,
W75-04755 6G

CITY PLANNING
Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

Investigation of Land Use of Northern Megalopolis Using ERTS-1 Imagery,
W75-04726 7C

The Urban Region Plan: Saint John, (New Brunswick), Urban Region Impact Study.
W75-04756 6B

CLAMS
Petroleum Hydrocarbons in Narragansett Bay: I. Survey of Hydrocarbons in Sediments and Clams (Mercenaria Mercenaria),
W75-04477 5B

CLEAR CREEK (TEX)
Special Flood Hazard Information: Clear Creek, Brazoria, Fort Bend, Galveston and Harris Counties, Texas.
W75-04743 4A

CLIMATES
Effect of Feedlot Laws and Climate on Open Feedlot Waste Management,
W75-04630 5D

CLIMATIC DATA
Rainfall Patterns and General Atmospheric Circulation,
W75-04513 2B

CLIMATOLOGY
Statistical Considerations About Snow Conditions in the Austrian Alps,
W75-04667 2C

CLINICAL DIAGNOSIS
Medical Uses of Isotopes,
W75-04417 5C

CLOUD COVER
The Problem of Calculating Cloud Cover in Calculations of Long Wave Radiational Characteristics of the Atmosphere,
W75-04740 2B

CLOUD PHYSICS
Diurnal Variations in Cloud Condensation Nuclei,
W75-04711 2B

Atmospheric Moisture Parameterization,
W75-04724 2B

CLOUD SEEDING
Atmospheric Water Resources Management Program - Bridger Range Cloud Seeding Experiment,
W75-04721 3B

CLOUDBURSTS
Some Intra-Storm Characteristics of High-Intensity Rainfall Bursts,
W75-04689 2B

COAGULATION
Turbidity Removal Using Polymers and Activated Carbon,
W75-04820 5F

Coagulation-Filtration Practice as Related to Research.
W75-04825 5D

COAL MINE WASTES
Method for Treatment of Coal Washery Waters,
W75-04463 5D

Acid Mine Water, A Bibliography,
W75-04625 5G

COALESCENCE
The Coalescence of Water Drops,
W75-04728 1A

COASTAL ZONE
Coastal Mapping Act,
W75-04582 6E

COASTAL ZONE MANAGEMENT
An Operational Framework for Coastal Zone Management Planning.
W75-04558 6A

A Brief Historical Survey of Freedom of the Seas,
W75-04648 6E

Offshore Oil Drilling at Santa Barbara, Part 1,
W75-04784 6E

COASTAL ZONE MANAGEMENT ACT
Coastal Resources Management and Conservation Report Published,
W75-04583 2L

COASTS
Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

Coastal Resources Management and Conservation Report Published,
W75-04583 2L

COLLISION-COALESCENCE PROCESS
The Coalescence of Water Drops,
W75-04728 1A

COLORADO
Routine Surveillance Alternatives for Water Quality Management,
W75-04803 5A

COLORADO RIVER
Effects of Agricultural Acreage Reduction on Water Availability and Salinity in the Upper Colorado River Basin,
W75-04368 6B

Procedural Methods for Implementing Colorado River Water Conservation Measures.
W75-04778 6E

COMBINED REFUSE/SEWAGE TREATMENT
An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

COMBINED SEWERS
Control Strategy Development Study, San Francisco Wastewater Master Plan,
W75-04352 5D

COMMERCIAL FISHING
Crisis in the South Pacific: Tunaboat Seizures,
W75-04649 6E

COMPOSTING
Indiana Poultrymen are Composting Poultry Manure,
W75-04552 5D

COMPREHENSIVE PLANNING
Final Environmental Statement Related to the Proposed Clinton Power Station Units 1 and 2, Illinois Power Company.
W75-04395 5G

Final Environmental Statement Related to Construction of River Bend Nuclear Power Station, Units 1 and 2, Gulf States Utilities Company.
W75-04396 5G

Final Environmental Statement Related to the Proposed Pilgrim Nuclear Power Station Unit 2 Boston Edison Company.
W75-04397 5G

ASCE Urban Water Resources Research Program, 1967-1974,
W75-04440 4A

A Balanced Approach to Resource Extraction and Creative Land Development Associated with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

The Urban Region Plan: Saint John, (New Brunswick), Urban Region Impact Study.
W75-04756 6B

Comprehensive Plan for Water, Sewer and Storm Drainage in the Lower Rio Grande Valley, (Volume II).
W75-04759 5D

A Compendium of Information, (The Metropolitan Toronto and Region Conservation Authority).
W75-04760 3D

Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

COMPUTER APPLICATIONS
Computer Use for River Regulation,
W75-04531 4A

COMPUTER MODELS
Design and Application of a Multipurpose Management Information System for Drinking Water Quality Assessment in Distribution Systems,
W75-04505 5G

Notes--Workshop on Computer-Aided Design and Simulation of Waste Treatment Systems,
W75-04518 5D

Isotopic and Chemical Considerations in Radiocarbon Dating of Groundwater Within the Arid Tucson Basin, Arizona,
W75-04647 7B

Computation of Air Flow Over Mountains in Statically Stable Situations,
W75-04663 2B

Orographic Influences on Distribution of Precipitation,
W75-04664 2B

A Hybrid Computer Simulation Model for Predicting the Effects of the Areal Distribution of Precipitation on Runoff Characteristics,
W75-04692 2B

Unsteady, Unsaturated, N-Dimensional Moisture Flow in Soil: A Computer Simulation Program,
W75-04701 2G

COMPUTER PROGRAMS
Notes--Workshop on Computer-Aided Design and Simulation of Waste Treatment Systems,
W75-04518 5D

Computer Use for River Regulation,
W75-04531 4A

Solution of Simultaneous Partial Differential Equations: An Extension of PDEL,
W75-04539 6A

Parameter Identification in Distributed Systems Using a Digital Simulation Language: An Extension of PDEL,
W75-04540 6A

Application of the Main II Water Forecasting System to Wyoming Communities,
W75-04541 6D

Areal Rainfall Analysis by Computer,
W75-04687 7C

Software for the Sigma-S,
W75-04731 7C

CONDEMNATION
Railroad and Canal Companies--Eminent Domain (As Amended),
W75-04580 6E

CONDENSATION
Recovery of Potable Water From Sanitary Waste Using Solid Wastes and Refuse as a Heat Source,
W75-04458 5D

Diurnal Variations in Cloud Condensation Nuclei,
W75-04711 2B

CONFINEMENT PENS
Tailor Made Confinement Barn,
W75-04617 5D

Nutrient Recovery: New Concept in Waste Handling,
W75-04620 5D

Slats in the Southwest,
W75-04621 5D

CONGERIA LEUCOPHAETA
The Effects of Mercuric Chloride Upon Respiration in Congeria Leucophaeta,
W75-04472 5C

CONGRESSIONAL HEARING
Offshore Oil Drilling at Santa Barbara, Part 1,
W75-04784 6E

CONGRESSIONAL HEARINGS
Amending the Act of July 4, 1955, as Amended, Relating to the Construction of Irrigation Distribution Systems.
W75-04597 6E

Flood Disaster Protection Act of 1973.
W75-04600 6F

Authorization for Secretary of Interior to Acquire Additional Wetlands.
W75-04651 6E

Amending the National Environmental Policy Act of 1969, to Provide for a National Environmental Data System.
W75-04785 6E

Nueces River Project, Texas, Part 1.
W75-04786 6E

Interim Nuclear Licensing.
W75-04788 6E

CONNECTICUT
An Operational Framework for Coastal Zone Management Planning.
W75-04558 6A

CONSTITUTIONAL LAW
Economic Disincentives for Pollution Control: Legal, Political, and Administrative Disincentives,
W75-04576 5G

CONSTRUCTION
Design, Construction and Launching of a Submarine Outfall Sewer at Whitstable,
W75-04536 5D

CONTACT WATER (OIL)
Contact (Oil) Water Determination in Terrestrial-Waters Using an Oceanographic Method,
W75-04502 5A

CONTAINMENT BOOMS
An Examination of Alternative Methods for Employing Booms to Contain Oil Spills in Navy Harbors,
W75-04720 5G

CONTINENTAL SHELF
Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale Offshore Mississippi, Alabama, and Florida, Volume 4, (Final Environmental Statement),
W75-04589 5G

Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale, Offshore Mississippi, Alabama, and Florida, Volume 5, (Final Environmental Statement),
W75-04590 5G

African Attitudes Toward the Law of the Sea,
W75-04771 6E

Offshore Oil Drilling at Santa Barbara, Part 1,
W75-04784 6E

CONTINUITY EQUATION
An Alternative Formulation of the Problem of Density Jump,
W75-04797 8B

CONTROL
Development of an Air Pollution Model for the San Francisco Bay Area. Third Semi annual Report to the National Science Foundation.
W75-04421 5A

Computer Control of Chemical Addition at a Water-Treatment Plant,
W75-04535 5F

Pierced Steel Planking Surfacing for Feedlot Runoff Control,
W75-04644 5D

CONTROL SYSTEMS
Control Strategy Development Study, San Francisco Wastewater Master Plan,
W75-04352 5D

Applicability of Control Strategies to the Activated Sludge Wastewater Treatment Process,
W75-04822 5D

COOLING WATER DISCHARGES
The Effect of Cooling Water Discharges on Zooplankton in a Bay of Lake Malaren,
W75-04496 5C

CORN (FIELD)
Comparison of Banded and Broadcast Fertilizer Applications in Relation to Compaction and Irrigation in Maize and Wheat,
W75-04611 3F

CORSICA (LAGOON OF BIGUGLIA)
Influence of Freshwater Dulution on Dynamics of Populations of Builder Crustaceans from Lagoon of Biguglia, Corsica (Corophium Insidiosum C., Tanais Cavolinii M.E., Erichthonius Brasiliensis D.), (In French),
W75-04490 2H

COST ANALYSIS
A Two-Dimensional Multi-Stage Programming Model: With Application to Reservoir Systems,
W75-04523 4A

Enforcement Economics in Air Pollution Control,
W75-04569 5G

COST-BENEFIT ANALYSIS
An Economic Analysis of Agricultural Land Use Practices to Control Water Quality,
W75-04526 5G

COSTS
Differences Between Planned and Actual Costs and Benefits in Small Watershed Development,
W75-04433 4D

Instrumentation Improves Water Treatment Plant Operation,
W75-04434 5F

Economics, (Literature Review),
W75-04846 5G

CRITICAL DEPTH METERS
Simplified Application of Palmer-Bowlus Flow Meters,
W75-04802 8B

CRITICAL PATH METHOD
Adoption of Network Techniques in the Planning and Execution of Irrigation and Power Projects,
W75-04533 3F

CROP PRODUCTION
Irrigation, Row width, and Plant Population in Relation to Growth Characteristics of Two Soybean Varieties,
W75-04369 3F

Range Plant Yield and Species Relationships in Natural and Partially Controlled Environments,
W75-04378 2I

Pattern of Water Availability and Water Requirement for Grain Sorghum Production at Samaru, Nigeria,
W75-04384 3F

The Role of Water and Land Resources in Alleviating Malnutrition and Hunger in Arid Regions,
W75-04603 6B

Model for Predicting Plant Yield as Influenced by Water Use,
W75-04609 2I

Some Effects of Subirrigation on Bentgrass During Heat Stress in the Field,
W75-04612 2I

Effects of Fertilizer and Available Moisture on the Yield and N and P Content of Wheat and on Soil Nutrients,
W75-04628 3F

CROP YIELD
Effect of Leaf Area Reduction on the Water Requirement of Barley (Hordeum Vulgare L.),
W75-04511 2I

CROPS
Effects of Cattle Feedlot Manure on Crop Yields and Soil Conditions,
W75-04833 5D

Manure Promoted for Cropland.
W75-04839 5G

CRUSTACEANS
Influence of Freshwater Dulution on Dynamics of Populations of Builder Crustaceans from Lagoon of Biguglia, Corsica (Corophium Insidiosum C., Tanais Cavolinii M.E., Erichthonius Brasiliensis D.), (In French),
W75-04490 2H

CYANIDES
Laboratory Study of Continuous Electrooxidation of Dilute Cyanide Wastes,
W75-04719 5D

CYPRESS CREEK (TEX)
Special Flood Hazard Information: Cypress Creek, Harris County, Texas.
W75-04742 4A

CYPRINODONTIDAE
Remarks on Bionomy of Family Cyprinodontidae (Pisces) with Respect to Dependency of Development of Embryos of Roloffia Foloffi (Ahl., 1938) on the Hardness of the Water, (In German),
W75-04494 2I

CZECHOSLOVAKIA (ORLIK VALLEY RESERVOIR)
Note on Growth of the Bream, Abramis Brama (Linnaeus, 1758) in the Orlik Valley Water Reservoir,
W75-04493 2I

DAIRY INDUSTRY
Economic and Environmental Considerations in Dairy Manure Management Systems,
W75-04543 5D

He Solved His Manure Handling Problem,
W75-04634 5D

Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

DATA COLLECTIONS
Planning for Water Quality in the Bear River System in the State of Utah.
W75-04757 5G

Amending the National Environmental Policy Act of 1969, to Provide for a National Environmental Data System.
W75-04785 6E

DATA PROCESSING
Computerized Calculation of Areal Precipitation and Its Accuracy,
W75-04688 7C

Estimating Areal Rainfall by Fitting Surfaces to Irregularly Spaced Data,
W75-04693 7C

Automation of the Collection and Analysis of Scientific Information in the Problem of the Interaction of the Atmosphere and Ocean,
W75-04729 2B

Automated System for Measurement, Collection and Processing of Hydrometeorological Data Aboard Scientific Research Vessels of the Gugms (Sigma-S),
W75-04730 7C

Software for the Sigma-S,
W75-04731 7C

The Problem of Organization of a Coastal Coordinating Computer Center,
W75-04732 7C

A System of Automated Processing of Deep Water Hydrological Information,
W75-04733 7C

Error in Interpolation and Choice of the Range of Discreteness in Measurements in a Hydrophysical Field,
W75-04734 7A

DATA STORAGE AND RETRIEVAL
Areal Rainfall Analysis by Computer,
W75-04687 7C

The Problem of Organization of a Coastal Coordinating Computer Center,
W75-04732 7C

DDT
Ecological History of DDT in Arizona,
W75-04387 5C

DECISION MAKING
A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

An Operational Framework for Coastal Zone Management Planning.
W75-04558 6A

DECISION THEORY
A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

DEFOLIATION
Effect of Leaf Area Reduction on the Water Requirement of Barley (Hordeum Vulgare L.),
W75-04511 2I

Effect of Leaf Area Reduction on the Water Requirement of Barley (Hordeum Vulgare L.),
W75-04511 2I

DEHYDRATION
Solid Adsorbents for Gas and Liquid Treatment,
W75-04826 5D

DEICERS
Manual for Deicing Chemicals: Application Practices,
W75-04567 5G

Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

DEICING CHEMICALS
Manual for Deicing Chemicals: Application Practices,
W75-04567 5G

DELAWARE RIVER
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

DELAWARE RIVER BASIN COMMISSION
Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

Water Quality Control--The Role of the Interstate Agency,
W75-04596 5G

DELAWARE RIVER BASIN COMPACT
Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

DEMAND
A Regional Model of the Future Demand For Transportation: The Case of Barge Transportation,
W75-04520 6A

DEMONSTRATION WATERSHEDS
Study of Subsurface Flow Into Mountain Streams as Related to Topography and Partial (Variable) Source Areas,
W75-04357 4D

The Varying Source Area of Streamflow from Upland Basins,
W75-04358 4D

The Distribution of Precipitation in Some Mountainous Canadian Watersheds,
W75-04671 2B

DENITRIFICATION
The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

Methods of Removing Nitrates From Water,
W75-04626 5D

DENSITY CURRENTS
An Alternative Formulation of the Problem of Density Jump,
W75-04797 8B

DENSITY JUMP
An Alternative Formulation of the Problem of Density Jump,
W75-04797 8B

DENSITY PROBES
The Effect of Soil Texture and Density on the Neutron and Density Probe Calibration for Some Tropical Soils,
W75-04549 2G

DENSITY STRATIFICATION
Rotating Hydraulics of Strait and Sill Flows,
W75-04716 2L

DES PLAINES RIVER (ILL-WIS)
Flood Plain Information: Report on the Des Plaines River, Illinois and Wisconsin.
W75-04746 4A

DESALINATION
Effects of Agricultural Acreage Reduction on Water Availability and Salinity in the Upper Colorado River Basin,
W75-04368 6B

The World's Largest Desalting Complex--A Report on Twenty Years Experience,
W75-04422 3A

Geothermal Wells in Imperial Valley, California: Desalting Potentials, Historical Development, and A Selected Bibliography,
W75-04423 3A

Utilization of the Earth's Natural Heating System to Desalt Geothermal Brines for Augmentation of the Colorado River System,
W75-04430 3A

Process and Apparatus for Separating Water From Non-Volatile Solutes,
W75-04451 3A

Vertical, Multistage-Flash, Falling Film Column for Distilling Brine,
W75-04459 3A

Method and Apparatus for Producing a Distillate,
W75-04465 3A

Hydrate Forming in Water Desalination,
W75-04466 3A

Methods of Removing Nitrates From Water,
W75-04626 5D

DESALINATION PLANTS
Universal Design of a 2.5 MGD Universal Desalting Plant, Revised: Volume 1.
W75-04850 3A

DESALINATION PROCESSES
The World's Largest Desalting Complex--A Report on Twenty Years Experience,
W75-04422 3A

DESERT PLANTS
The Influence of Soil Water Potential on the Perennial Vegetation of a Desert Arroyo,
W75-04365 2I

Phenological Events and Their Environmental Triggers in Mojave Desert Ecosystems,
W75-04385 2I

DESERTS
Distribution of Different Forms of Nitrogen in Some Desert Soils,
W75-04373 2G

DESIGN
Design and Application of a Multipurpose Management Information System for Drinking Water Quality Assessment in Distribution Systems,
W75-04505 5G

Notes--Workshop on Computer-Aided Design and Simulation of Waste Treatment Systems,
W75-04518 5D

A systems Analysis of Water Quality Survey Design,
W75-04522 5B

The Design of a Livestock Water Distribution System--Large Scale,
W75-04527 3F

Design, Construction and Launching of a Submarine Outfall Sewer at Whitstable,
W75-04536 5D

Tentative Criteria for Design, Construction and Operation of the Batch Type Pasveer Oxidation Ditch System for the Treatment of Animal Wastes,
W75-04636 5D

Settling Basin Design for Raceway Fish Production Systems,
W75-04646 5D

Rational Basis for Septic Tank System Design,
W75-04801 5D

Development of Guidelines for the Design of Subsurface Drainage Systems for Highway Pavement Structural Sections,
W75-04809 8A

DESIGN CRITERIA
Water Management Systems,
W75-04538 3F

Tertiary Treatment: The Wrong Solution to a Non-Problem,
W75-04811 5D

DESIGN DATA
Hydraulic Analysis of Winnipeg Sump Inlets,
W75-04804 5D

DESIGN FLOW
A Method for Determining Peak Flows and Detention Storage Requirements in Urbanizing Areas.
W75-04694 4A

DESIGN STANDARDS
Universal Design of a 2.5 MGD Universal Desalting Plant, Revised: Volume 1.
W75-04850 3A

DESIGN STORM
Some Intra-Storm Characteristics of High-Intensity Rainfall Bursts,
W75-04689 2B

DETERGENTS
Biodegradability of a Carboxymethyloxysuccinate Detergent Builder,
W75-04426 5D

Trickling Filtration of a Waste Containing NTA,
W75-04427 5D

DEWATERING
Dewatering Bovine Animal Manure,
W75-04627 5D

DIATOMS
Environmental Requirements and Pollution Tolerance of Freshwater Diatoms,
W75-04563 5C

DIET
Effect of Ration on Manure Salt Content,
W75-04834 5D

DIFFUSIVE MODELS
Simple Albedo Feedback Models of the Icecaps,
W75-04794 2C

DIFFUSIVITY
Salt and Water Movement in Relatively Dry Soil,
W75-04516 2G

DIGESTORS
New Aerobic Process Turns Waste to Nutrients,
W75-04619 5D

DIMICTIC LAKES
Temperature Dynamics in Dimictic Lakes,
W75-04705 2H

DIPTERA
Some Effects of Spring Snowmelt Runoff on Aquatic Invertebrate Populations in a High Moutain Stream,
W75-04450 2I

DISCHARGE COEFFICIENT
Simplified Application of Palmer-Bowlus Flow Meters,
W75-04802 8B

Hydraulic Analysis of Winnipeg Sump Inlets,
W75-04804 5D

DISCHARGE (WATER)
Complying with Discharge Regulations,
W75-04431 5G

DISEASES
Medical Uses of Isotopes,
W75-04417 5C

DISINCENTIVES (ECONOMIC)
Economic Disincentives for Pollution Control: Legal, Political, and Administrative Disincentives,
W75-04576 5G

DISINFECTION
Method for Electrosanitizing Waste Water,
W75-04464 5D

DISSOLVED OXYGEN
Biologic Detection and Control of Water Pollution,
W75-04447 5C

DISTILLATION
The World's Largest Desalting Complex--A Report on Twenty Years Experience,
W75-04422 3A

Process and Apparatus for Separating Water From Non-Volatile Solutes,
W75-04451 3A

Vertical, Multistage-Flash, Falling Film Column for Distilling Brine,
W75-04459 3A

Method and Apparatus for Producing a Distillate,
W75-04465 3A

DISTRIBUTION PATTERNS
Vertical Distribution of Freshwater Mussels (Pelecypoda, Unionidae) in Southwestern Finland,
W75-04486 2I

Distribution and Ecology of Amphipodes (Especially Gammarides) in the Basin and Estuary of the Dourduff River (Brittany, France), (In French),
W75-04488 2I

The Occurrence of Young Sardinella Aurita in the Brackish Water of the Lagoons of Cananeia (Brazil), (In German),
W75-04492 2L

Distribution of Precipitation in the Sognefjord Region,
W75-04665 2B

About Vertical Gradients of Liquid Precipitation in Mountains,
W75-04668 2B

Methods for the Study of Laws for the Distribution of Precipitation in Medium-High Mountains (Illustrated by the Vitim River Basin),
W75-04669 2B

The Distribution of Precipitation in Some Mountainous Canadian Watersheds,
W75-04671 2B

Physiographically Adjusted Precipitation-Frequency Maps,
W75-04672 2B

Distribution of Precipitation in Mountainous Areas of West Pakistan,
W75-04674 2B

Orographic Influences on the Distribution of Precipitation,
W75-04676 2B

DISTRIBUTION SYSTEMS
Solution of Simultaneous Partial Differential Equations: An Extension of PDEL,
W75-04539 6A

Water-Distribution Research and Applied Development Needs.
W75-04763 6B

DISTRICT OF COLUMBIA
Montgomery Environmental Coalition, Et Al. V. Fri, Et Al. (Seeking Declaratory Relief from Further Sewer Hookups on Potomac).
W75-04591 5G

DISTRUBUTION SYSTEMS
The Design of a Livestock Water Distribution System--Large Scale,
W75-04527 3F

DITCHES
Hendrix, Et Al. V. Creel, Et Al. (Action for Injunction to Compel Municipal Corporation to Clear and Maintain Ditch).
W75-04782 6E

DIURNAL DISTRIBUTION
Diurnal Temperature Distribution in Small Reservoir,
W75-04443 2H

Diurnal Variations in Cloud Condensation Nuclei,
W75-04711 2B

DOMESTIC WASTES
Sewage Treatment System,
W75-04456 5D

An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

Subsurface Sewage Disposal and Contamination of Ground Water in East Portland, Oregon,
W75-04798 5B

Rational Basis for Septic Tank System Design,
W75-04801 5D

Sources of Metals in New York City Wastewater,
W75-04805 5B

Uniform Distribution in Soil Absorption Fields,
W75-04807 5D

DOMESTIC WATER
Design and Application of a Multipurpose Management Information System for Drinking Water Quality Assessment in Distribution Systems,
W75-04505 5G

DOSE
Population Radiation Exposure,
W75-04420 5C

DOSE-RATE
Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

DOSIMETRY
Radiation Dosimetry,
W75-04414 5C

Radiation Biophysics,
W75-04415 5C

Medical Grade Plutonium-238 From Americium-241,
W75-04418 5C

DRAINAGE
Calculation of the Drainage Component of Soil Water Depletion,
W75-04374 2G

The Effect of Initial Moisture Content and Infiltration Quantity of Redistribution of Soil Water,
W75-04517 2G

Prediction of Drainage Requirements -- Buyuk Menderes River Basin, Turkey,
W75-04534 4A

Drainage for Agriculture,
W75-04537 3F

Water Management Systems,
W75-04538 3F

Hendrix, Et Al. V. Creel, Et Al. (Action for Injunction to Compel Municipal Corporation to Clear and Maintain Ditch).
W75-04782 6E

Development of Guidelines for the Design of Subsurface Drainage Systems for Highway Pavement Structural Sections,
W75-04809 8A

DRAINAGE SYSTEMS
Amending the Act of July 4, 1955, as Amended, Relating to the Construction of Irrigation Distribution Systems.
W75-04597 6E

Comprehensive Plan for Water, Sewer and Storm Drainage in the Lower Rio Grande Valley, (Volume II).
W75-04759 5D

DREDGING
Permit Provisions Adopted for Ocean Water Activity,
W75-04587 5G

DROPS (FLUIDS)
The Coalescence of Water Drops,
W75-04728 1A

DRYLAND CONDITIONS
Effectiveness of Two Nitrification Inhibitors for Anhydrous Ammonia Under Irrigated and Dryland Conditions,
W75-04425 5G

DURATION CURVES
Some Intra-Storm Characteristics of High-Intensity Rainfall Bursts,
W75-04689 2B

A Hydrological Assessment of Precipitation in the Western Highlands of New Guinea,
W75-04690 2B

DUST STORMS
Tornado or Dust Devel: The Enigma of Desert Whirlwinds,
W75-04372 2B

DYNAMIC MODELING
Optimal Weighting Function in Water Quality Modeling,
W75-04614 5B

DYNAMIC PROGRAMMING
A Two-Dimensional Multi-Stage Programming Model: With Application to Reservoir Systems,
W75-04523 4A

Optimal Operation of Multiple Reservoir System,
W75-04532 4A

DYNAMIC RESPONSE
A Critical Examination of the Turbulence Instrument used in the Marsta Micro-Meteorological Field Project,
W75-04795 7B

EASTERN ALPS
Influence of Orography on the Share of Precipitation in the East Alpine High Mountains,
W75-04679 2B

ECOLOGICAL STUDIES
An Ecological Study of a Baldcypress Swamp in St. Charles Parish, Louisiana,
W75-04364 2H

ECOLOGY
Production Ecology of Two Caribbean Marine Ecosystems: II. Metabolism and Energy Flow,
W75-04480 5C

Distribution and Ecology of Amphipodes (Especially Gammarides) in the Basin and Estuary of the Dourduff River (Brittany, France), (In French),
W75-04488 2I

Amending the National Environmental Policy Act of 1969, to Provide for a National Environmental Data System.
W75-04785 6E

ECONOMIC ANALYSIS
An Economic Analysis of Agricultural Land Use Practices to Control Water Quality,
W75-04526 5G

ECONOMIC IMPACT
Regulation of Great Lakes Water Levels--Appendix E--Commercial Navigation.
W75-04601 2H

ECONOMICS
Economics of Fertilizer Application on Range and Meadow Sites in Utah,
W75-04388 2I

A Regional Model of the Future Demand For Transportation: The Case of Barge Transportation,
W75-04520 6A

Economic Disincentives for Pollution Control: Legal, Political, and Administrative Disincentives,
W75-04576 5G

ECOSYSTEMS
Phenological Events and Their Environmental Triggers in Mojave Desert Ecosystems,
W75-04385 2I

Production Ecology of Two Caribean Marine Ecosystems: I. Physical Environment and Fauna,
W75-04479 5C

Production Ecology of Two Caribbean Marine Ecosystems: II. Metabolism and Energy Flow,
W75-04480 5C

On the Vulnerability of Ecosystems Disturbed by Man,
W75-04521 5C

EFFLUENT CHARGES
Water Pollution--Liquid Wastes (As Amended).
W75-04777 5G

EFFLUENTS
Final Environmental Statement Related to the Proposed Clinton Power Station Units 1 and 2, Illinois Power Company.
W75-04395 5G

Final Environmental Statement Related to Construction of River Bend Nuclear Power Station, Units 1 and 2, Gulf States Utilities Company.
W75-04396 5G

Complying with Discharge Regulations,
W75-04431 5G

EGYPT
The Rising Water Table in the West Nubarya Area of Egypt,
W75-04363 4B

ELASTICITY OF DEMAND
Demand for Irrigation: A Case Study of Government Tube-Wells in Uttar Pradesh,
W75-04529 6D

ELECTRIC POWERPLANTS
Process and Apparatus for Separating Water From Non-Volatile Solutes,
W75-04451 3A

ELECTRICAL EQUIPMENT
The Problem of Selecting an Optimum Frequency for a Measuring Generator in Determining the Value of the Hydrophysical Parameter with a Given Accuracy,
W75-04735 7B

ELECTROCHEMISTRY
Laboratory Study of Continuous Electrooxidation of Dilute Cyanide Wastes,
W75-04719 5D

ELECTRON MICROSCOPY
Method for the Construction of Three-Dimensional Electron Micrographs,
W75-04394 5A

ELECTRONS
Radiation Physics,
W75-04413 5C

ELECTROOXIDATION
Laboratory Study of Continuous Electrooxidation of Dilute Cyanide Wastes,
W75-04719 5D

ELEVATION
On the Problem of Vertical Distribution of Precipitation, Especially in Areas with Great Height Differences,
W75-04680 2B

EMBRYO DEVELOPMENT
Remarks on Bionomy of Family Cyprinodontidae (Pisces) with Respect to Dependency of Development of Embryos of Roloffia Foloffi (Ahl., 1938) on the Hardness of the Water, (In German),
W75-04494 2I

EMINENT DOMAIN
Railroad and Canal Companies--Eminent Domain (As Amended),
W75-04580 6E

EMINENT DOMAIN

In Re Highway US-24, in Bloomfield Township, Oakland County (Highway Condemnation Proceeding).
W75-04776 6E

ENERGY

Geothermal Wells in Imperial Valley, California: Desalting Potentials, Historical Development, and A Selected Bibliography,
W75-04423 3A

Utilization of the Earth's Natural Heating System to Desalt Geothermal Brines for Augmentation of the Colorado River System,
W75-04430 3A

On the Vulnerability of Ecosystems Disturbed by Man,
W75-04521 5C

Energy Needed to Manage Animal Waste.
W75-04554 5D

ENERGY BUDGET

Energy Budget Measurements Over Three Cover Types in Eastern Arizona,
W75-04383 2I

Temperature Dynamics in Dimictic Lakes,
W75-04705 2H

ENERGY CRISIS

The Law of Maritime Oil Spills,
W75-04770 6E

Union of Concerned Scientists V. Atomic Energy Comm'n. (Review of Orders of AEC Licensing Nuclear Powerplant).
W75-04775 6E

ENERGY FLOW

Production Ecology of Two Caribbean Marine Ecosystems: II. Metabolism and Energy Flow,
W75-04480 5C

ENTEROBACTERIA

Enterobacteria in Feedlot Waste and Runoff,
W75-04633 5A

ENTROPHICATION

Internal Waves as Causative Mechanisms of Island Mass Effects,
W75-04481 5C

ENVIRONMENT

Pacific Northwest Laboratory Annual Report for 1973 to the USAEC Division of Biomedical and Environmental Research Part 4. Physical and Analytical Sciences,
W75-04410 5C

Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

ENVIRONMENTAL CONTROL

An In-Depth Look at Federal Pollution Controls,
W75-04544 5G

E.P.A. Policy to Protect the Nation's Wetlands.
W75-04593 5G

A Survey of Federal and Mississippi Environmental Law with an Examination of its effect on Land Development,
W75-04845 6G

ENVIRONMENTAL EFFECTS

Radiation Biophysics,
W75-04415 5C

A Balanced Approach to Resource Extraction and Creative Land Development Associated with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

Environmental Consequences of Land Use in Arid and Semiarid Areas,
W75-04514 6G

On the Vulnerability of Ecosystems Disturbed by Man,
W75-04521 5C

EPA to Issue Impact Statements on Some Regulatory Actions,
W75-04586 5G

Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale Offshore Mississippi, Alabama, and Florida, Volume 4, (Final Environmental Statement),
W75-04589 5G

Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale, Offshore Mississippi, Alabama, and Florida, Volume 5, (Final Environmental Statement),
W75-04590 5G

EPA Policy on Injection Wells.
W75-04592 5G

Aquatic Plant Control Program, State of Florida (Final Environmental Impact Statement).
W75-04598 5G

Engineering a Victory for the Environment: A Citizen's Guide to the U.S. Army Corps of Engineers,
W75-04755 6G

The Law of Maritime Oil Spills,
W75-04770 6E

ENVIRONMENTAL ENGINEERING

Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

Design, Construction and Launching of a Submarine Outfall Sewer at Whitstable,
W75-04536 5D

ENVIRONMENTAL IMPACT ASSESSMENT

Directory of Environmental Life Scientists,
W75-04468 6G

ENVIRONMENTAL IMPACT STATEMENT

EPA to Issue Impact Statements on Some Regulatory Actions,
W75-04586 5G

Union of Concerned Scientists V. Atomic Energy Comm'n. (Review of Orders of AEC Licensing Nuclear Powerplant).
W75-04775 6E

ENVIRONMENTAL IMPACT STATEMENTS

Final Environmental Statement Related to the Proposed Clinton Power Station Units 1 and 2, Illinois Power Company.
W75-04395 5G

Final Environmental Statement Related to Construction of River Bend Nuclear Power Station, Units 1 and 2, Gulf States Utilities Company.
W75-04396 5G

Final Environmental Statement Related to the Proposed Pilgrim Nuclear Power Station Unit 2 Boston Edison Company.
W75-04397 5G

Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale Offshore Mississippi, Alabama, and Florida, Volume 4, (Final Environmental Statement),
W75-04589 5G

Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale, Offshore Mississippi, Alabama, and Florida, Volume 5, (Final Environmental Statement),
W75-04590 5G

Aquatic Plant Control Program, State of Florida (Final Environmental Impact Statement).
W75-04598 5G

Interim Nuclear Licensing.
W75-04788 6E

ENVIRONMENTAL POLICY

Environmental Land and Water Management Act--Amendments,
W75-04581 5G

Water Quality Management Basin Plans Regulations Adopted,
W75-04584 5G

EPA Policy on Injection Wells.
W75-04592 5G

ENVIRONMENTAL QUALITY

Environmental Values and Water Quality Planning,
W75-04530 5G

ENVIRONMENTAL SANITATION

International Environmental Bibliographies--Environmental Legislation--North America.
W75-04594 6G

EPIPHYTIC ALGAE

A New Technique for the Study of Epiphytic Algae,
W75-04499 5C

EQUATIONS

Solution of Simultaneous Partial Differential Equations: An Extension of PDEL,
W75-04539 6A

Manure Application Guidelines for the Pacific Northwest,
W75-04631 5G

EQUATIONS OF MOTION (ATMOSPHERIC)

Frontal Motion in the Atmosphere,
W75-04792 2B

EROSION

Soil Erosion and Sediment Transport from Gullies,
W75-04707 2J

EROSION CONTROL

Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

Inflatable Barriers for Watercourses,
W75-04467 8A

Soil Conservation--Administration of Departments and Conservancy Districts.
W75-04773 6E

ERROR ANALYSIS

A Critical Examination of the Turbulence Instrument used in the Marsta Micro-Meteorological Field Project,
W75-04795 7B

ERRORS
Error in Interpolation and Choice of the Range of Discreteness in Measurements in a Hydrophysical Field,
W75-04734 7A

ESTIMATING
Expectation and Dispersion Matrices for the Estimation of Distributions Associated with Discrete Reservoirs,
W75-04525 4A

Application of the Main II Water Forecasting System to Wyoming Communities,
W75-04541 6D

Estimating Areal Rainfall by Fitting Surfaces to Irregularly Spaced Data,
W75-04693 7C

ESTUARIES
Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

ESTUARINE ENVIRONMENT
Abundance, Diversity and Seasonal Patterns of Estuarine Fish Populations,
W75-04485 5C

ESTUARINE RESOURCES
Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

ESTUARY
Dissolved and Particulate Humic Acid in an East Coast Estuary,
W75-04504 5B

EUTROPHICATION
Nutrient Enrichment of Groundwater from Septic Tank Disposal Systems,
W75-04758 5C

EVALUATION
Medical Grade Plutonium-238 From Americium-241,
W75-04418 5C

Swine Waste Management Systems,
W75-04629 5D

EVAPORATION
Process and Apparatus for Separating Water From Non-Volatile Solutes,
W75-04451 3A

Recovery of Potable Water From Sanitary Waste Using Solid Wastes and Refuse as a Heat Source,
W75-04458 5D

Evaporation Losses from Storage Gauges,
W75-04657 7B

A Method for Measuring First-Stage Soil Water Evaporation in the Field,
W75-04698 2D

Feedlot Waste Effects on Soil Conditions and Water Evaporation,
W75-04699 5B

EVAPORATORS
Universal Design of a 2.5 MGD Universal Desalting Plant, Revised: Volume 1.
W75-04850 3A

EVAPORIMETERS
A Method for Measuring First-Stage Soil Water Evaporation in the Field,
W75-04698 2D

EVAPOTRANSPIRATION
Calculation of the Drainage Component of Soil Water Depletion,
W75-04374 2G

Energy Budget Measurements Over Three Cover Types in Eastern Arizona,
W75-04383 2I

Water Yield as an Index of Lee and Windward Topographic Effects on Precipitation,
W75-04678 2B

A Method for Measuring First-Stage Soil Water Evaporation in the Field,
W75-04698 2D

Synthesis of Hydrograph Recessions Adjusted for Evapotranspiration Losses,
W75-04712 2E

EVAPOTRANSPIRATION CONTROL
Management of Phreatophyte and Riparian Vegetation for Maximum Multiple Use Values,
W75-04379 3B

EXCESSIVE PRECIPITATION
Maximum Daily Precipitation in Gorski Kotar and Lika (Yugoslavia) in Relation to the Overflying Air-Stream,
W75-04666 2B

Frequent Occurrence of Heavy Rainfall Along the North Side to the Low-Level Jet Stream in the Baiu Season,
W75-04704 2B

EXTRATERRESTRIAL
High-Level Radioactivity Waste Management Alternatives - Section 8: Extraterrestrii Disposal,
W75-04408 5D

FABRICATION
Universal Design of a 2.5 MGD Universal Desalting Plant, Revised: Volume 1.
W75-04850 3A

FARM MANAGEMENT
EPA Efforts to End Feedlot Manure Pollution Criticized,
W75-04585 5G

FARM WASTES
A Prototype System to Renovate and Recycle Swine Wastes Hydraulically,
W75-04542 5D

Economic and Environmental Considerations in Dairy Manure Management Systems,
W75-04543 5D

An In-Depth Look at Federal Pollution Controls,
W75-04544 5G

Coprology: A Pollution Solution,
W75-04545 5D

Farms are Not in the Country Any More,
W75-04546 5D

Surface Water Quality is Influenced by Agricultural Practices,
W75-04548 5B

Fertility,
W75-04550 5D

Indiana Poultrymen are Composting Poultry Manure,
W75-04552 5D

Energy Needed to Manage Animal Waste.
W75-04554 5D

Perpetual-Motion Recycling, or, Pig Manure Into Fish Food,
W75-04555 5D

Recycle Organic Wastes as Feed for Meat Animals.
W75-04556 5D

EPA Efforts to End Feedlot Manure Pollution Criticized,
W75-04585 5G

Comparative Changes in Soil-Physical Properties Induced by Admixtures of Manures from Various Domestic Animals,
W75-04602 2G

Control of Pollution from Animal Feedlots and Reuse of Animal Wastes,
W75-04615 5D

Development of an Organic Waste Slurry Injector,
W75-04616 5D

Tailor Made Confinement Barn,
W75-04617 5D

New Aerobic Process Turns Waste to Nutrients,
W75-04619 5D

Nutrient Recovery: New Concept in Waste Handling,
W75-04620 5D

Fast Fluch System,
W75-04622 5D

Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

Dewatering Bovine Animal Manure,
W75-04627 5D

Swine Waste Management Systems,
W75-04629 5D

Effect of Feedlot Laws and Climate on Open Feedlot Waste Management,
W75-04630 5D

Manure Application Guidelines for the Pacific Northwest,
W75-04631 5G

Management of Swine Waste by a Lagoon System,
W75-04632 5D

Enterobacteria in Feedlot Waste and Runoff,
W75-04633 5A

He Solved His Manure Handling Problem,
W75-04634 5D

Manure Handling Systems for the Future,
W75-04635 5D

Tentative Criteria for Design, Construction and Operation of the Batch Type Pasveer Oxidation Ditch System for the Treatment of Animal Wastes,
W75-04636 5D

FARM WASTES

Test Swine Waste Disposal Systems,
W75-04637 5D

Irrigation for Land Application of Animal Waste,
W75-04638 5D

EPA Preparing to 'Railroad' Through New Pollution Rules Covering Cattle Feedlots,
W75-04639 5G

In-The-Building Oxidation Ditches for Livestock Wastes,
W75-04643 5D

Pierced Steel Planking Surfacing for Feedlot Runoff Control,
W75-04644 5D

Laboratory Studies on Feedlot Runoff,
W75-04653 5D

Feedlot Waste Effects on Soil Conditions and Water Evaporation,
W75-04699 5B

Symposium on Animal Waste Management.
W75-04832 5D

Effects of Cattle Feedlot Manure on Crop Yields and Soil Conditions,
W75-04833 5D

Effect of Ration on Manure Salt Content,
W75-04834 5D

Future Developments in Feedlot Waste Management,
W75-04836 5D

Philosophy on Livestock Waste Regulation,
W75-04838 5G

Manure Promoted for Cropland.
W75-04839 5G

The Relationship Between Animal Wastes and Water Quality.
W75-04840 5G

Analyzing Biological Properties of Wastes,
W75-04842 5A

Water Quality of Storm Runoff from a Texas Beef Feedlot,
W75-04843 5B

FARMS

Farms are Not in the Country Any More,
W75-04546 5D

FASCICLE DENSITY (PINES)

Fascicle Density and Needle Growth Responses of Red Pine to Water Supply Over Two Seasons,
W75-04424 2I

FAUNA

Production Ecology of Two Caribean Marine Ecosystems: I. Physical Environment and Fauna,
W75-04479 5C

FEASIBILITY STUDIES

High-Level Radioactive Waste Management Alternatives - Section 1-3: Summary, Background and Data Base, and Evaluation Methodology.
W75-04403 5D

FEDERAL GOVERNMENT

Coastal Resources Management and Conservation Report Published,
W75-04583 2L

Flood Disaster Protection Act of 1973.
W75-04600 6F

Authorization for Secretary of Interior to Acquire Additional Wetlands.
W75-04651 6E

A Bill to Assure Safe Drinking Water.
W75-04652 6E

Bill to Establish the Potomac National River in the States of Maryland, Virginia, West Virginia, and the District of Columbia and for Other Purposes.
W75-04772 6E

Offshore Oil Drilling at Santa Barbara, Part 1,
W75-04784 6E

Interim Nuclear Licensing.
W75-04788 6E

FEDERAL JURISDICTION

Montgomery Environmental Coalition, Et Al. V. Fri, Et Al. (Seeking Declaratory Relief from Further Sewer Hookups on Potomac).
W75-04591 5G

FEDERAL WATER POLLUTION CONTROL ACT

Complying with Discharge Regulations,
W75-04431 5G

Montgomery Environmental Coalition, Et Al. V. Fri, Et Al. (Seeking Declaratory Relief from Further Sewer Hookups on Potomac).
W75-04591 5G

Water Quality Standards: The Federal Perspective--Progress Toward Objectives,
W75-04595 5G

Amelioration of Effects of Oil Spills.
W75-04779 5G

FEED LOTS

An In-Depth Look at Federal Pollution Controls,
W75-04544 5G

Reducing Feedlot Nitrates in Your Ground Water,
W75-04547 5B

Control of Pollution from Animal Feedlots and Reuse of Animal Wastes,
W75-04615 5D

Fast Fluch System,
W75-04622 5D

Enterobacteria in Feedlot Waste and Runoff,
W75-04633 5A

He Solved His Manure Handling Problem,
W75-04634 5D

EPA Preparing to 'Railroad' Through New Pollution Rules Covering Cattle Feedlots,
W75-04639 5G

Pierced Steel Planking Surfacing for Feedlot Runoff Control,
W75-04644 5D

Feedlot Waste Effects on Soil Conditions and Water Evaporation,
W75-04699 5B

Effects of Cattle Feedlot Manure on Crop Yields and Soil Conditions,
W75-04833 5D

Amounts, Composition, and Management of Feedlot Runoff,
W75-04835 5D

Future Developments in Feedlot Waste Management,
W75-04836 5D

Water Quality of Storm Runoff from a Texas Beef Feedlot,
W75-04843 5B

FEEDLOTS

EPA Efforts to End Feedlot Manure Pollution Criticized,
W75-04585 5G

Effect of Feedlot Laws and Climate on Open Feedlot Waste Management,
W75-04630 5D

Laboratory Studies on Feedlot Runoff,
W75-04653 5D

FEEDS

Sewage-Grown Algae as a Feedstuff for Chicks,
W75-04618 5D

FERTILITY

Fertility,
W75-04550 5D

FERTILIZERS

Economics of Fertilizer Application on Range and Meadow Sites in Utah,
W75-04388 2I

Effect of Qualities of Irrigation Water and Fertilizers on Soil Properties, Yield and Nutrient Uptake by Wheat,
W75-04482 3F

Surface Water Quality is Influenced by Agricultural Practices,
W75-04548 5B

Fertility,
W75-04550 5D

Comparative Changes in Soil-Physical Properties Induced by Admixtures of Manures from Various Domestic Animals,
W75-04602 2G

Comparison of Banded and Broadcast Fertilizer Applications in Relation to Compaction and Irrigation in Maize and Wheat,
W75-04611 3F

New Aerobic Process Turns Waste to Nutrients,
W75-04619 5D

Effects of Fertilizer and Available Moisture on the Yield and N and P Content of Wheat and on Soil Nutrients,
W75-04628 3F

Manure Promoted for Cropland.
W75-04839 5G

FILTER PAPER METHOD

Evaluation of the Filter Paper Method for Estimating Soil Water Potential,
W75-04506 2G

FILTERABILITY TESTS

Coagulation-Filtration Practice as Related to Research.
W75-04825 5D

FILTERS
Granular Filters for Tertiary Wastewater Treatment,
W75-04429 5D

Apparatus for the Filtration and Biological Purification of Contaminated Water,
W75-04454 5D

Self-Reconditioning Filter Apparatus for Continuous Removal of Solids From a Stream of Liquid,
W75-04460 5D

Precoat Filtration on Rotary Vacuum Filter (Precoat-Filtration Auf Dem Vakuum-Trommelfilter),
W75-04810 5D

FILTRATION
Granular Filters for Tertiary Wastewater Treatment,
W75-04429 5D

Apparatus for the Filtration and Biological Purification of Contaminated Water,
W75-04454 5D

Self-Reconditioning Filter Apparatus for Continuous Removal of Solids From a Stream of Liquid,
W75-04460 5D

Method for Treatment of Coal Washery Waters,
W75-04463 5D

Trace Metals in Wastewater Effluents,
W75-04806 5B

Precoat Filtration on Rotary Vacuum Filter (Precoat-Filtration Auf Dem Vakuum-Trommelfilter),
W75-04810 5D

Coagulation-Filtration Practice as Related to Research.
W75-04825 5D

FINLAND
Vertical Distribution of Freshwater Mussels (Pelecypoda, Unionidae) in Southwestern Finland,
W75-04486 2I

FINNISH ARCHIPELAGO
Littoral Fish Populations After an Oil Tanker Disaster in the Finnish SW Archipelago,
W75-04487 5C

FIR KRUMMHOLZ
Deposition of Water and Cations on Artificial Foliar Collectors in Fir Krummholz of New England Mountains,
W75-04471 2K

FISH
Effects of Pollution on Freshwater Fish, (Literature Review),
W75-04848 5C

FISH BEHAVIOR
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

FISH DIETS
Perpetual-Motion Recycling, or, Pig Manure Into Fish Food,
W75-04555 5D

FISH FARMING
Perpetual-Motion Recycling, or, Pig Manure Into Fish Food,
W75-04555 5D

FISH POPULATIONS
Abundance, Diversity and Seasonal Patterns of Estuarine Fish Populations,
W75-04485 5C

Littoral Fish Populations After an Oil Tanker Disaster in the Finnish SW Archipelago,
W75-04487 5C

FISH STOCKING
Freshwater Jellyfish (Craspedacusta Sowerbyi) in Lake Patagonia, Southern Arizona,
W75-04386 8I

FISH WASTES
Settling Basin Design for Raceway Fish Production Systems,
W75-04646 5D

FISHKILL
Arkansas State Game and Fish Comm'n. v. Eubank (Suit Enjoin Proposed Partial Fish Kill).
W75-04844 6E

FLASH DISTILLATION
Vertical, Multistage-Flash, Falling Film Column for Distilling Brine,
W75-04459 3A

Method and Apparatus for Producing a Distillate,
W75-04465 3A

Universal Design of a 2.5 MGD Universal Desalting Plant, Revised: Volume 1.
W75-04850 3A

FLETCHER-POWELL METHOD
Parameter Identification in Distributed Systems Using a Digital Simulation Language: An Extension of PDEL,
W75-04540 6A

FLOATING BARRIERS
An Examination of Alternative Methods for Employing Booms to Contain Oil Spills in Navy Harbors,
W75-04720 5G

FLOCCULATION
Water Clarification with Nitrogen-Heterocyclic Phosphonic Acids,
W75-04457 5D

Coagulation-Filtration Practice as Related to Research.
W75-04825 5D

FLOOD CONTROL
Flood Hazard Reports: Tools for Resource Planning and Management,
W75-04432 4A

A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

Special Flood Hazard Information: Cypress Creek, Harris County, Texas.
W75-04742 4A

Special Flood Hazard Information: Clear Creek, Brazoria, Fort Bend, Galveston and Harris Counties, Texas.
W75-04743 4A

Flood Plain Information: Blue River and Tributaries, Johnson County, Kansas.
W75-04744 4A

Flood Plain Information: North Fork Rivanna River, Albemarle County, Virginia.
W75-04745 4A

Flood Plain Information -- Williamson Creek, Austin, Texas.
W75-04747 4A

Flood Plain Information - Cedar Bayou, Houston Metropolitan Area, Texas.
W75-04748 4A

Flood Plain Information: Big Creek, Chetolah Creek and Lincoln Draw, Hays, Kansas.
W75-04749 4A

Flood Plain Information: Shunganunga Creek, Topeka, Kansas.
W75-04751 4A

Flood Plain Information--Coastal Flooding, City of Chesapeake, Virginia.
W75-04753 4A

A Compendium of Information, (The Metropolitan Toronto and Region Conservation Authority).
W75-04760 3D

FLOOD DAMAGE
Flood Plain Information -- Williamson Creek, Austin, Texas.
W75-04747 4A

Flood Plain Information--Coastal Flooding, City of Chesapeake, Virginia.
W75-04753 4A

FLOOD DATA
Flood Hazard Reports: Tools for Resource Planning and Management,
W75-04432 4A

Flood Plain Information: Report on the Des Plaines River, Illinois and Wisconsin.
W75-04746 4A

Flood Plain Information: (Patuxent River) Western Branch (Folly, Lottsford and Vald Hill Br.), Prince Georges County, Maryland.
W75-04754 4A

FLOOD FORECASTING
Flood Hazard Reports: Tools for Resource Planning and Management,
W75-04432 4A

Flood Plain Information: Report on the Des Plaines River, Illinois and Wisconsin.
W75-04746 4A

Flood Plain Information - Cedar Bayou, Houston Metropolitan Area, Texas.
W75-04748 4A

Flood Plain Information: (Patuxent River) Western Branch (Folly, Lottsford and Vald Hill Br.), Prince Georges County, Maryland.
W75-04754 4A

FLOOD PLAIN
Flood Plain Information: North Fork Rivanna River, Albemarle County, Virginia.
W75-04745 4A

FLOOD PLAIN INSURANCE
Flood Disaster Protection Act of 1973.
W75-04600 6F

FLOOD PLAIN MANAGEMENT
Flood Plain Information -- Williamson Creek, Austin, Texas.
W75-04747 4A

FLOOD PLAIN ZONING
Special Flood Hazard Information: Cypress Creek, Harris County, Texas.
W75-04742 4A

Special Flood Hazard Information: Clear Creek, Brazoria, Fort Bend, Galveston and Harris Counties, Texas.
W75-04743 4A

FLOOD PLAINS
Flood Hazard Reports: Tools for Resource Planning and Management,
W75-04432 4A

Special Flood Hazard Information: Cypress Creek, Harris County, Texas.
W75-04742 4A

Flood Plain Information: Blue River and Tributaries, Johnson County, Kansas.
W75-04744 4A

Flood Plain Information: Report on the Des Plaines River, Illinois and Wisconsin.
W75-04746 4A

Flood Plain Information: Big Creek, Chetolah Creek and Lincoln Draw, Hays, Kansas.
W75-04749 4A

Flood Plain Information: Mechunk Creek, Albemarle County, Virginia.
W75-04752 4A

Flood Plain Information: (Patuxent River) Western Branch (Folly, Lottsford and Vald Hill Br.), Prince Georges County, Maryland.
W75-04754 4A

FLOOD PROFILES
Flood Plain Information: Blue River and Tributaries, Johnson County, Kansas.
W75-04744 4A

Flood Plain Information: Shunganunga Creek, Topeka, Kansas.
W75-04751 4A

FLOOD PROTECTION
Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

Flood Disaster Protection Act of 1973.
W75-04600 6F

Special Flood Hazard Information: Cypress Creek, Harris County, Texas.
W75-04742 4A

Special Flood Hazard Information: Clear Creek, Brazoria, Fort Bend, Galveston and Harris Counties, Texas.
W75-04743 4A

Flood Plain Information: Blue River and Tributaries, Johnson County, Kansas.
W75-04744 4A

Flood Plain Information: North Fork Rivanna River, Albemarle County, Virginia.
W75-04745 4A

Flood Plain Information: Big Creek, Chetolah Creek and Lincoln Draw, Hays, Kansas.
W75-04749 4A

Flood Plain Information: Shunganunga Creek, Topeka, Kansas.
W75-04751 4A

Authorizing the Secretary of the Interior to Construct, Operate, and Maintain the Touchet Division, Walla Walla Project, Oregon-Washington, and for Other Purposes.
W75-04790 6E

FLOOD RECURRENCE INTERVAL
Physiographically Adjusted Precipitation-Frequency Maps,
W75-04672 2B

FLOOD ROUTING
Numerical Simulation of Unsteady Flow Hydraulics of Truckee River,
W75-04444 6A

Evaluation Problem of Storm Water Routing Mathematical Models,
W75-04708 5D

FLOOD WAVES
Flood Plain Information--Coastal Flooding, City of Chesapeake, Virginia.
W75-04753 4A

FLOODING
Flood Plain Information: North Fork Rivanna River, Albemarle County, Virginia.
W75-04745 4A

Flood Plain Information -- Goose Creek, Baytown, Texas.
W75-04750 4A

Flood Plain Information: Mechunk Creek, Albemarle County, Virginia.
W75-04752 4A

Flood Plain Information: (Patuxent River) Western Branch (Folly, Lottsford and Vald Hill Br.), Prince Georges County, Maryland.
W75-04754 4A

FLOODS
Flood Plain Information -- Goose Creek, Baytown, Texas.
W75-04750 4A

Flood Plain Information: Mechunk Creek, Albemarle County, Virginia.
W75-04752 4A

Flood Plain Information: (Patuxent River) Western Branch (Folly, Lottsford and Vald Hill Br.), Prince Georges County, Maryland.
W75-04754 4A

FLOODS PROFILES
Flood Plain Information - Cedar Bayou, Houston Metropolitan Area, Texas.
W75-04748 4A

FLORIDA
Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

Railroad and Canal Companies--Eminent Domain (As Amended),
W75-04580 6E

Environmental Land and Water Management Act--Amendments,
W75-04581 5G

Coastal Mapping Act,
W75-04582 6E

Aquatic Plant Control Program, State of Florida (Final Environmental Impact Statement).
W75-04598 5G

Aquatic Plant Control.
W75-04599 6E

FLOTATION
Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

FLOW
Drainage for Agriculture,
W75-04537 3F

FLOW CHARACTERISTICS
Flood Plain Information: (Patuxent River) Western Branch (Folly, Lottsford and Vald Hill Br.), Prince Georges County, Maryland.
W75-04754 4A

FLOW CONTROL
Surge Facility for Wet and Dry Weather Flow Control,
W75-04562 5D

FLOW MEASUREMENT
Simplified Application of Palmer-Bowlus Flow Meters,
W75-04802 8B

FLOW RATES
Relative Rates of Flow of the Negro and Solimoes Rivers (Determined) Through O18 Concentrations, (In Porteguese),
W75-04495 2E

FLOW SEPARATION
Bifurcation Characteristic Reynolds Number,
W75-04715 8B

FLUID MECHANICS
Channel Flow Driven by a Stationary Thermal Source,
W75-04793 8B

FLUORIDES
Fluoride Concentrations in Two Pacific Coast Inlets-An Indication of Industrial Contamination,
W75-04473 5B

FOG
An Assessment of Warm Fog - Nucleation, Control, and Recommended Research,
W75-04717 2B

FOG MICROPHYSICS
An Assessment of Warm Fog - Nucleation, Control, and Recommended Research,
W75-04717 2B

FOOD CHAINS
Mercury in Aquatic Systems: Methylation, Oxidation-Reduction, and Bioaccumulation,
W75-04570 5B

FOOD PROCESSING INDUSTRY
Wastewater analysis and its Relation to Company Profits,
W75-04817 5A

FOOD SAFETY
Mercury in Food: A Scientific Status Summary by the Institute of Food Technologists' Expert Panel on Food Safety and Nutrition,
W75-04579 5C

FOODS
Wastewater Characterization for the Specialty Food Industry,
W75-04560 5B

FORAGE GRASSES
Response of Herbaceous Vegetation to Felling of Alligator Juniper,
W75-04376 2I

Range Plant Yield and Species Relationships in Natural and Partially Controlled Environments,
W75-04378 2I

Economics of Fertilizer Application on Range and Meadow Sites in Utah,
W75-04388 2I

FORECASTING
Prediction of Drainage Requirements -- Buyuk Menderes River Basin, Turkey,
W75-04534 4A

Application of the Main II Water Forecasting System to Wyoming Communities,
W75-04541 6D

Manure Handling Systems for the Future,
W75-04635 5D

A Possibility of Airflow - Precipitation Regime Investigations,
W75-04660 2B

A Hybrid Computer Simulation Model for Predicting the Effects of the Areal Distribution of Precipitation on Runoff Characteristics,
W75-04692 2B

Temperature Dynamics in Dimictic Lakes,
W75-04705 2H

The Objective Analysis of Relative Humidity,
W75-04791 2B

FOREGIN TRADE
The Blockade 'Exception' To Territorial Water Jurisdiction,
W75-04766 6E

FOREIGN RESEARCH
The World's Largest Desalting Complex--A Report on Twenty Years Experience,
W75-04422 3A

FOREIGN TRADE
A Brief Historical Survey of Freedom of the Seas,
W75-04648 6E

FOREST HYDROLOGY
An Analysis of Forest Water Problems in Georgia,
W75-04356 4D

FORESTS
An Analysis of Forest Water Problems in Georgia,
W75-04356 4D

FRACTIONATORS
Closed-Loop Ozone Generating and Contacting System,
W75-04461 5D

FRANCE (DOURDUFF RIVER)
Distribution and Ecology of Amphipodes (Especially Gammarides) in the Basin and Estuary of the Dourduff River (Brittany, France), (In French),
W75-04488 2I

FREE SURFACES
An Experimental Study of the Free Surface Effect on a Buoyant Jet,
W75-04559 8B

FREQUENCY ANALYSIS
Physiographically Adjusted Precipitation-Frequency Maps,
W75-04672 2B

A Hydrological Assessment of Precipitation in the Western Highlands of New Guinea,
W75-04690 2B

FRONTS (ATMOSPHERIC)
Tornado or Dust Devel: The Enigma of Desert Whirlwinds,
W75-04372 2B

Frontal Motion in the Atmosphere,
W75-04792 2B

FRUIT PEEL REMOVAL
Dry Caustic Peeling of Clingstone Peaches on a Commercial Scale,
W75-04564 5D

FUEL REPROCESSING
Retrievable Surface Storage Facility, Alternative Concepts Engineering Studies.
W75-04401 5D

FUELS
Measurement of Hydrocarbons in Water: Application to Cases of Surface Water Pollution,
W75-04709 5A

FWPCA AMENDMENTS OF 1972
Montgomery Environmental Coalition, Et Al. V. Fri, Et Al. (Seeking Declaratory Relief from Further Sewer Hookups on Potomac).
W75-04591 5G

Water Quality Standards: The Federal Perspective--Progress Toward Objectives,
W75-04595 5G

GARBAGE
The Social Redemption of Pure Garbage,
W75-04553 5D

GAS AND LIQUID TREATMENT
Solid Adsorbents for Gas and Liquid Treatment,
W75-04826 5D

GAS CHROMATOGRAPHY
A Leak-Proof Sampling Port in Gas Analyses Studies,
W75-04697 7B

GASES
A Leak-Proof Sampling Port in Gas Analyses Studies,
W75-04697 7B

GEOCHEMISTRY
Controls on the Quality Variations of Some Carbonate Spring Waters,
W75-04710 2F

GEOGRAPHICAL REGIONS
Directory of Environmental Life Scientists,
W75-04468 6G

GEOLOGIC FORMATIONS
High-Level Radioactive Waste Management Alternatives - Section 4: Geologic Disposal.
W75-04404 5D

GEORGIA
An Analysis of Forest Water Problems in Georgia,
W75-04356 4D

GEOSMIN PRODUCTION
Microbiological Production of Geosmin,
W75-04561 5D

GEOSTROPHIC EQUATIONS
Orographic Influences on Distribution of Precipitation,
W75-04664 2B

GEOTHERMAL STUDIES
Geothermal Wells in Imperial Valley, California: Desalting Potentials, Historical Development, and A Selected Bibliography,
W75-04423 3A

Utilization of the Earth's Natural Heating System to Desalt Geothermal Brines for Augmentation of the Colorado River System,
W75-04430 3A

GERMANY (HOHENPEISSENBERG MT)
Rainfall at the Hohenpeissenberg and the Weather Situation,
W75-04662 2B

Area Precipitation Measurement with X-Band Radar from a Mountain North of the Alps,
W75-04691 7B

GERMANY (OKER RIVER)
Salmonella and Natural Purification of Polluted Waters, (In German),
W75-04578 5C

GERMINATION
Water Uptake by Seeds as Affected by Water Stress, Capillary Conductivity, and Seed-Soil Water Contact. I. Experimental Study and, II. Analysis of Experimental Data,
W75-04381 2I

GLACIOLOGY
Simple Albedo Feedback Models of the Icecaps,
W75-04794 2C

GOVERNMENT FINANCE
Amending the Act of July 4, 1955, as Amended, Relating to the Construction of Irrigation Distribution Systems.
W75-04597 6E

Authorization for Secretary of Interior to Acquire Additional Wetlands.
W75-04651 6E

GOVERNMENTAL INTERRELATIONS
An Operational Framework for Coastal Zone Management Planning.
W75-04558 6A

The Blockade 'Exception' To Territorial Water Jurisdiction,
W75-04766 6E

Incorporated Village of Cornwall V. Environmental Protection Administration of the City of New York (Village Seeking Annulment of Withdrawal of Conditional Approval for Interconnection with Aqueduct from Upstate Watershed and Issuance of Final Approval of Application).
W75-04781 6E

GRADIENT FLOW
A Possibility of Airflow - Precipitation Regime Investigations,
W75-04660 2B

GRAIN SORGHUM
Pattern of Water Availability and Water Requirement for Grain Sorghum Production at Samaru, Nigeria,
W75-04384 3F

GRAIN SORGHUM

Susceptibility of Grain Sorghum to Water Deficit at Three Growth Stages,
W75-04483 3F

GRASSES
Infiltration for Three Rangeland Soil-Vegetation Complexes,
W75-04377 2G

GRASSLANDS
Dominance of California Annual Grasslands by Brassica Nigra,
W75-04435 2I

GRAVITY WAVES
The Problem of the Influence of Ocean Currents on Free Internal Gravity Waves,
W75-04739 2L

GREAT LAKES
Regulation of Great Lakes Water Levels--Appendix E--Commercial Navigation.
W75-04601 2H

GREEN BAY (WIS)
Nitrogen Fixation (Acetylene Reduction) by Phytoplankton in Green Bay, Lake Michigan, in Relation to Nutrient Concentrations,
W75-04498 5C

GREENLAND
High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

GRINDERS (REFUSE)
An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

GROUND WATER
Nutrient Enrichment of Groundwater from Septic Tank Disposal Systems,
W75-04758 5C

GROUNDWATER
The Rising Water Table in the West Nubarya Area of Egypt,
W75-04363 4B

The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

Management of Phreatophyte and Riparian Vegetation for Maximum Multiple Use Values,
W75-04379 3B

Groundwater Pumpage in Northern Illinois, 1960-1970,
W75-04727 4B

GROUNDWATER BASINS
Isotopic and Chemical Considerations in Radiocarbon Dating of Groundwater Within the Arid Tucson Basin, Arizona,
W75-04647 7B

GROUNDWATER MOVEMENT
Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

Reducing Feedlot Nitrates in Your Ground Water,
W75-04547 5B

Organic Compounds Entering Ground Water from a Landfill,
W75-04573 5B

GROWTH RATES
Susceptibility of Grain Sorghum to Water Deficit at Three Growth Stages,
W75-04483 3F

Note on Growth of the Bream, Abramis Brama (Linnaeus, 1758) in the Orlik Valley Water Reservoir,
W75-04493 2I

Relative Influence of Moisture-Aeration and Nutrients on Vegetation and Black Spruce Growth in Northern Ontario,
W75-04837 2I

GUAM
Jurisdiction of Submerged Lands--Guam, the Virgin Islands and American Samoa.
W75-04783 6E

GULF COASTAL PLAIN
Raindrop Characteristics in South Central United States,
W75-04713 2B

GULF OF MEXICO
Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale Offshore Mississippi, Alabama, and Florida, Volume 4, (Final Environmental Statement),
W75-04589 5G

Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale, Offshore Mississippi, Alabama, and Florida, Volume 5, (Final Environmental Statement),
W75-04590 5G

GULLIES
Soil Erosion and Sediment Transport from Gullies,
W75-04707 2J

HAIL
Hail and Its Distribution,
W75-04604 2C

HATCHING
Some Effects of Spring Snowmelt Runoff on Aquatic Invertebrate Populations in a High Moutain Stream,
W75-04450 2I

HAWAII
Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

Some Characteristics of Hawaiian High-Intensity Rainfall,
W75-04442 2B

HAZARDOUS SUBSTANCES (POLLUTION)
The Disposal of Radioactive Wastes Into the Sea: Some International Legal Considerations,
W75-04769 6E

HEAT
Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

Recipient Radiation Exposure - Circulatory Support Systems,
W75-04419 5C

Mechanism of Fire-Induced Water Repellency in Soil,
W75-04515 2G

HEAT BALANCE
The Temperature Profiles of Soil Columns During Infiltration,
W75-04389 2G

HEAT DIFFUSION
Parameter Identification in Distributed Systems Using a Digital Simulation Language: An Extension of PDEL,
W75-04540 6A

HEAT FLOW
Estimate of Heat Fluxes on the Subjacent Surface (According to Data from Synoptic Analysis),
W75-04737 7C

Channel Flow Driven by a Stationary Thermal Source,
W75-04793 8B

HEAT OF CONDENSATION
Process and Apparatus for Separating Water From Non-Volatile Solutes,
W75-04451 3A

HEAT OF HYDRATION
Hydrate Forming in Water Desalination,
W75-04466 3A

HEAT SOURCES
Recipient Radiation Exposure - Circulatory Support Systems,
W75-04419 5C

HEAT TRANSFER
The Temperature Profiles of Soil Columns During Infiltration,
W75-04389 2G

Estimate of Heat Fluxes on the Subjacent Surface (According to Data from Synoptic Analysis),
W75-04737 7C

HEATED DISCHARGE
Influence of Heated Discharge Waters from the 'Skawina' Electric Power Station on the Ichthyofauna of the Rivers Skawinka and Vistula,
W75-04491 5C

HEAVY METALS
Mercury in Aquatic Systems: Methylation, Oxidation-Reduction, and Bioaccumulation,
W75-04570 5B

HIGH-LEVEL WASTES
High-Level Radioactive Waste Management Alternatives.
W75-04402 5D

HIGHWAYS
Development of Guidelines for the Design of Subsurface Drainage Systems for Highway Pavement Structural Sections,
W75-04809 8A

HOGS
Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

A Prototype System to Renovate and Recycle Swine Wastes Hydraulically,
W75-04542 5D

Swine Waste Management Systems,
W75-04629 5D

Management of Swine Waste by a Lagoon System,
W75-04632 5D

Test Swine Waste Disposal Systems,
W75-04637 5D

HOLDING PONDS
Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

HUMAN PATHOLOGY
Medical Uses of Isotopes,
W75-04417 5C

HUMAN POPULATION
Population Radiation Exposure,
W75-04420 5C

Environmental Consequences of Land Use in Arid and Semiarid Areas,
W75-04514 6G

HUMAN RESOURCES
Environmental Values and Water Quality Planning,
W75-04530 5G

The Role of Water and Land Resources in Alleviating Malnutrition and Hunger in Arid Regions,
W75-04603 6B

HUMIC ACID
Dissolved and Particulate Humic Acid in an East Coast Estuary,
W75-04504 5B

HUMIDITY
Reconstructing the Vertical Profile of Humidity on the Basis of the Vertical Profile of Temperature,
W75-04741 2B

The Objective Analysis of Relative Humidity,
W75-04791 2B

HURRICANE TIDAL FLOODING
Flood Plain Information - Cedar Bayou, Houston Metropolitan Area, Texas.
W75-04748 4A

HYDRATION
Hydrate Forming in Water Desalination,
W75-04466 3A

HYDRAULIC CONDUCTIVITY
Water Uptake by Seeds as Affected by Water Stress, Capillary Conductivity, and Seed-Soil Water Contact. I. Experimental Study and, II. Analysis of Experimental Data,
W75-04381 2I

Comparative Changes in Soil-Physical Properties Induced by Admixtures of Manures from Various Domestic Animals,
W75-04602 2G

The Combined Effects of Infiltration and Redistribution on Leaching,
W75-04606 2G

HYDRAULIC JUMP
An Alternative Formulation of the Problem of Density Jump,
W75-04797 8B

HYDRAULIC TRANSPORT
An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

HYDROELECTRIC POWER
Computer Use for River Regulation,
W75-04531 4A

HYDROGEOLOGY
Controls on the Quality Variations of Some Carbonate Spring Waters,
W75-04710 2F

HYDROGRAPH ANALYSIS
Numerical Simulation of Unsteady Flow Hydraulics of Truckee River,
W75-04444 6A

Synthesis of Hydrograph Recessions Adjusted for Evapotranspiration Losses,
W75-04712 2E

HYDROLOGIC DATA
A Two-Dimensional Multi-Stage Programming Model: With Application to Reservoir Systems,
W75-04523 4A

Computer Use for River Regulation,
W75-04531 4A

ICE
High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

Hail and Its Distribution,
W75-04604 2C

Simple Albedo Feedback Models of the Icecaps,
W75-04794 2C

ICE FORMATION
Hydrate Forming in Water Desalination,
W75-04466 3A

ICE STONES
Hail and Its Distribution,
W75-04604 2C

ICEBERGS
Water Rights and Assessments, (Proposals Involving Antarctic Icebergs for the Colorado River Basin, California, Mexico and Other Arid Lands),
W75-04610 3B

IDAHO
Improved Instrumentation for Measuring Melted Precipitation on Windswept Topography,
W75-04655 7B

Authorizing the Secretary of the Interior to Construct, Operate, and Maintain the East Greenacres Unit, Rathdrum Prairie Project, Idaho, and for Other Purposes.
W75-04787 6E

ILLINOIS
Final Environmental Statement Related to the Proposed Clinton Power Station Units 1 and 2, Illinois Power Company.
W75-04395 5G

Groundwater Pumpage in Northern Illinois, 1960-1970,
W75-04727 4B

Flood Plain Information: Report on the Des Plaines River, Illinois and Wisconsin.
W75-04746 4A

IMPACT (RAINFALL)
Raindrop Characteristics in South Central United States,
W75-04713 2B

IMPERIAL VALLEY (CALIF)
Geothermal Wells in Imperial Valley, California: Desalting Potentials, Historical Development, and A Selected Bibliography,
W75-04423 3A

Utilization of the Earth's Natural Heating System to Desalt Geothermal Brines for Augmentation of the Colorado River System,
W75-04430 3A

IN-UNIT CONTROL
Chemicals and Allied Products, (Literature Review),
W75-04474 5G

INCINERATION
Fluidized-Bed Sludge Incinerator Design,
W75-04428 5D

INDEX RELATIONS
Physiographically Adjusted Precipitation-Frequency Maps,
W75-04672 2B

INDIA (BHATGHAR RIVER-KOYNA RIVER)
Study of Orographic Effect on Optimum Number of Raingauges,
W75-04681 7A

INDIA (UTTAR PRADESH)
Demand for Irrigation: A Case Study of Government Tube-Wells in Uttar Pradesh,
W75-04529 6D

INDIANA
Indiana Poultrymen are Composting Poultry Manure,
W75-04552 5D

Irrigation for Land Application of Animal Waste,
W75-04638 5D

Waterworks Department in Certain Cities.
W75-04774 6E

INDUSTRIAL USE
Authorizing the City of Sherman, Tex., to Construct a Barrier in Denison Dam (Lake Texoma) Red River, Tex. and Okla., for the Purpose of Providing a Municipal and Industrial Water Supply.
W75-04789 6E

INDUSTRIAL WASTES
Wastewater Characterization for the Specialty Food Industry,
W75-04560 5B

Laboratory Study of Continuous Electrooxidation of Dilute Cyanide Wastes,
W75-04719 5D

Sources of Metals in New York City Wastewater,
W75-04805 5B

Wastewater analysis and its Relation to Company Profits,
W75-04817 5A

INDUSTRIAL WATER
The Design and Promotion of a Scheme Using Mixed Water from the Rivers Ancholme, Witham and Trent for Industrial Supply to Humberside,
W75-04764 3E

INFILTRATION
Infiltration for Three Rangeland Soil-Vegetation Complexes,
W75-04377 2G

The Temperature Profiles of Soil Columns During Infiltration,
W75-04389 2G

The Effect of Initial Moisture Content and Infiltration Quantity of Redistribution of Soil Water,
W75-04517 2G

Surge Facility for Wet and Dry Weather Flow Control,
W75-04562 5D

The Combined Effects of Infiltration and Redistribution on Leaching,
W75-04606 2G

INFILTRATION RATES
Simulation of Moisture Transfer in Soils: One-Dimensional Infiltration,
W75-04695 2G

Two-Dimensional Water Infiltration from a Trench in Unsaturated Soils,
W75-04700 2G

Unsteady, Unsaturated, N-Dimensional Moisture Flow in Soil: A Computer Simulation Program,
W75-04701 2G

INFLATABLE BARRIERS
Inflatable Barriers for Watercourses,
W75-04467 8A

INFORMATION EXCHANGE
Directory of Environmental Life Scientists,
W75-04468 6G

INFRARED FILM
Water Quality by Photographic Analysis,
W75-04814 5A

INHIBITION EXPERIMENTS
Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. II. Inhibition Experiments,
W75-04470 5C

INJECTION
Development of an Organic Waste Slurry Injector,
W75-04616 5D

INJECTION WELLS
EPA Policy on Injection Wells.
W75-04592 5G

INJUNCTIVE RELIEF
Bergen County Sewer Authority V. Hackensack Meadowlands Development Commission (Seeking Declaratory Judgment that Plaintiff not Subject to Land Use Regulations of Defendant in Constructing Addition to Sewage Plant).
W75-04780 6E

INPUT-OUTPUT ANALYSIS
Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

INSECTS
Wood Boring Insect Infestations in Relation to Mesquite Control Practices,
W75-04380 3B

INSTRUMENT
Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

INSTRUMENTATION
Method for the Construction of Three-Dimensional Electron Micrographs,
W75-04394 5A

Nuclear Techniques in Medical Science,
W75-04412 5A

Instrumentation Improves Water Treatment Plant Operation,
W75-04434 5F

Improved Instrumentation for Measuring Melted Precipitation on Windswept Topography,
W75-04655 7B

Automated System for Measurement, Collection and Processing of Hydrometeorological Data Aboard Scientific Research Vessels of the Gugms (Sigma-S),
W75-04730 7C

The Problem of Selecting an Optimum Frequency for a Measuring Generator in Determining the Value of the Hydrophysical Parameter with a Given Accuracy,
W75-04735 7B

A Critical Examination of the Turbulence Instrument used in the Marsta Micro-Meteorological Field Project,
W75-04795 7B

INTAKES
Hydraulic Analysis of Winnipeg Sump Inlets,
W75-04804 5D

INTER-AGENCY COOPERATION
A Bill to Assure Safe Drinking Water.
W75-04652 6E

INTER-RIVER TRANSFER WORKS
The Design and Promotion of a Scheme Using Mixed Water from the Rivers Ancholme, Witham and Trent for Industrial Supply to Humberside,
W75-04764 3E

INTERNAL WATER
Jurisdiction in National Waters,
W75-04650 6E

INTERNATIONAL AGREEMENTS
Jurisdiction in National Waters,
W75-04650 6E

The International Seabed Regime: Proposals and Prospects for Realization,
W75-04767 6E

The Disposal of Radioactive Wastes Into the Sea: Some International Legal Considerations,
W75-04769 6E

African Attitudes Toward the Law of the Sea,
W75-04771 6E

INTERNATIONAL COMMISSIONS
Crisis in the South Pacific: Tunaboat Seizures,
W75-04649 6E

INTERNATIONAL JOINT COMMISSION
Regulation of Great Lakes Water Levels--Appendix E--Commercial Navigation.
W75-04601 2H

INTERNATIONAL LAW
A Brief Historical Survey of Freedom of the Seas,
W75-04648 6E

Crisis in the South Pacific: Tunaboat Seizures,
W75-04649 6E

Jurisdiction in National Waters,
W75-04650 6E

The Blockade 'Exception' To Territorial Water Jurisdiction,
W75-04766 6E

The Marine Environment and Toxic Substances (When was the Last Time You had a Good Swordfish Steak),
W75-04768 6E

The Law of Maritime Oil Spills,
W75-04770 6E

INTERNATIONAL WATERS
A Brief Historical Survey of Freedom of the Seas,
W75-04648 6E

Crisis in the South Pacific: Tunaboat Seizures,
W75-04649 6E

INTERPOLATION
Error in Interpolation and Choice of the Range of Discreteness in Measurements in a Hydrophysical Field,
W75-04734 7A

INTERSTATE COMMISSIONS
Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

Water Quality Control--The Role of the Interstate Agency,
W75-04596 5G

INVERSE CONDEMNATION
Railroad and Canal Companies--Eminent Domain (As Amended),
W75-04580 6E

INVERTEBRATES
Some Effects of Spring Snowmelt Runoff on Aquatic Invertebrate Populations in a High Moutain Stream,
W75-04450 2I

ION FLOTATION
Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

IONIC EQUILIBRIUM
The Effect of Salinity and Ionic Equilibrium on Contamination of Arenicola Marina L. (Annelida: Polychaeta) by Cesium-137, (In French),
W75-04489 5C

IOWA
Granular Filters for Tertiary Wastewater Treatment,
W75-04429 5D

Tailor Made Confinement Barn,
W75-04617 5D

Test Swine Waste Disposal Systems,
W75-04637 5D

Soil Erosion and Sediment Transport from Gullies,
W75-04707 2J

Soil Conservation--Administration of Departments and Conservancy Districts.
W75-04773 6E

Virological Studies in Water Systems: Natural Occurrence of Reoviruses and Their Inactivation by Physical and Chemical Agents,
W75-04821 5F

IRRIGATED LAND
The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

Effectiveness of Two Nitrification Inhibitors for Anhydrous Ammonia Under Irrigated and Dryland Conditions,
W75-04425 5G

IRRIGATION
Use of Leaf Resistance for Predicting Irrigation Scheduling,
W75-04351 3F

Irrigation, Row width, and Plant Population in Relation to Growth Characteristics of Two Soybean Varieties,
W75-04369 3F

Calculation of the Drainage Component of Soil Water Depletion,
W75-04374 2G

Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04391 2C

Environmental Consequences of Land Use in Arid and Semiarid Areas,
W75-04514 6G

Environmental Consequences of Land Use in Arid and Semiarid Areas,
W75-04514 6G

Adoption of Network Techniques in the Planning and Execution of Irrigation and Power Projects,
W75-04533 3F

Prediction of Drainage Requirements -- Buyuk Menderes River Basin, Turkey,
W75-04534 4A

Water Management Systems,
W75-04538 3F

Amending the Act of July 4, 1955, as Amended, Relating to the Construction of Irrigation Distribution Systems.
W75-04597 6E

Fast Fluch System,
W75-04622 5D

Irrigation for Land Application of Animal Waste,
W75-04638 5D

Authorizing the Secretary of the Interior to Construct, Operate, and Maintain the Touchet Division, Walla Walla Project, Oregon-Washington, and for Other Purposes.
W75-04790 6E

IRRIGATION EFFECTS
Some Effects of Subirrigation on Bentgrass During Heat Stress in the Field,
W75-04612 2I

IRRIGATION EFFICIENCY
More Water for Arid Lands, Promising Technologies and Research Opportunities.
W75-04508 3B

IRRIGATION PRACTICES
Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04391 2C

IRRIGATION PROGRAMS
More Water for Arid Lands, Promising Technologies and Research Opportunities.
W75-04508 3B

IRRIGATION SYSTEM
Authorizing the Secretary of the Interior to Construct, Operate, and Maintain the East Greenacres Unit, Rathdrum Prairie Project, Idaho, and for Other Purposes.
W75-04787 6E

IRRIGATION SYSTEMS
Winch-Driven Irrigation Apparatus,
W75-04452 3F

IRRIGATION WATER
Effect of Qualities of Irrigation Water and Fertilizers on Soil Properties, Yield and Nutrient Uptake by Wheat,
W75-04482 3F

Demand for Irrigation: A Case Study of Government Tube-Wells in Uttar Pradesh,
W75-04529 6D

Prediction of Drainage Requirements -- Buyuk Menderes River Basin, Turkey,
W75-04534 4A

ISLAND MASS EFFECTS
Internal Waves as Causative Mechanisms of Island Mass Effects,
W75-04481 5C

JAPAN
Frequent Occurrence of Heavy Rainfall Along the North Side to the Low-Level Jet Stream in the Baiu Season,
W75-04704 2B

Kinetics in Ozone Treatment of Secondary Sewage Effluents, (In Japanese),
W75-04831 5D

JELLY FISH
Freshwater Jellyfish (Craspedacusta Sowerbyi) in Lake Patagonia, Southern Arizona,
W75-04386 8I

JETS
An Experimental Study of the Free Surface Effect on a Buoyant Jet,
W75-04559 8B

JUDICIAL DECISIONS
Zahn, ET AL. V. International Paper Co. (Class Action Seeking Damages from Discharges),
W75-04588 6E

Montgomery Environmental Coalition, Et Al. V. Fri, Et Al. (Seeking Declaratory Relief from Further Sewer Hookups on Potomac).
W75-04591 5G

Union of Concerned Scientists V. Atomic Energy Comm'n. (Review of Orders of AEC Licensing Nuclear Powerplant).
W75-04775 6E

In Re Highway US-24, in Bloomfield Township, Oakland County (Highway Condemnation Proceeding).
W75-04776 6E

Bergen County Sewer Authority V. Hackensack Meadowlands Development Commission (Seeking Declaratory Judgment that Plaintiff not Subject to Land Use Regulations of Defendant in Constructing Addition to Sewage Plant).
W75-04780 6E

Incorporated Village of Cornwall V. Environmental Protection Administration of the City of New York (Village Seeking Annulment of Withdrawal of Conditional Approval for Interconnection with Aqueduct from Upstate Watershed and Issuance of Final Approval of Application).
W75-04781 6E

Hendrix, Et Al. V. Creel, Et Al. (Action for Injunction to Compel Municipal Corporation to Clear and Maintain Ditch).
W75-04782 6E

Arkansas State Game and Fish Comm'n. v. Eubank (Suit Enjoin Proposed Partial Fish Kill).
W75-04844 6E

JUNIPER TREES
Response of Herbaceous Vegetation to Felling of Alligator Juniper,
W75-04376 2I

JURISDICTION
Zahn, ET AL. V. International Paper Co. (Class Action Seeking Damages from Discharges),
W75-04588 6E

Jurisdiction in National Waters,
W75-04650 6E

Bergen County Sewer Authority V. Hackensack Meadowlands Development Commission (Seeking Declaratory Judgment that Plaintiff not Subject to Land Use Regulations of Defendant in Constructing Addition to Sewage Plant).
W75-04780 6E

Jurisdiction of Submerged Lands--Guam, the Virgin Islands and American Samoa.
W75-04783 6E

KANSAS
Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

Flood Plain Information: Blue River and Tributaries, Johnson County, Kansas.
W75-04744 4A

Flood Plain Information: Big Creek, Chetolah Creek and Lincoln Draw, Hays, Kansas.
W75-04749 4A

Flood Plain Information: Shunganunga Creek, Topeka, Kansas.
W75-04751 4A

KINETIC ENERGY
Floating Wave Barrier,
W75-04453 8A

KUWAIT
The World's Largest Desalting Complex--A Report on Twenty Years Experience,
W75-04422 3A

LABORATORY TESTS
Bifurcation Characteristic Reynolds Number,
W75-04715 8B

Hydraulic Analysis of Winnipeg Sump Inlets,
W75-04804 5D

LAGOONS
The Occurrence of Young Sardinella Aurita in the Brackish Water of the Lagoons of Cananeia (Brazil), (In German),
W75-04492 2L

LAKE MICHIGAN
Nitrogen Fixation (Acetylene Reduction) by Phytoplankton in Green Bay, Lake Michigan, in Relation to Nutrient Concentrations,
W75-04498 5C

LAKE SEDIMENTS
Sediment Trap Efficiency of Small Reservoirs,
W75-04702 2J

LAKE VECHTEN (NETHERLANDS)
Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. I. Field Observations,
W75-04469 5C

LAKES
Temperature Measurements and Internal Waves in Senaca Lake, New York,
W75-04400 2H

Temperature Dynamics in Dimictic Lakes,
W75-04705 2H

LAND APPLICATION
Irrigation for Land Application of Animal Waste,
W75-04638 5D

LAND DEVELOPMENT
An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

LAND DISPOSAL
Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

LAND MANAGEMENT
Environmental Land and Water Management Act--Amendments,
W75-04581 5G

A Compendium of Information, (The Metropolitan Toronto and Region Conservation Authority).
W75-04760 3D

LAND RESOURCES
Environmental Land and Water Management Act--Amendments,
W75-04581 5G

A Survey of Federal and Mississippi Environmental Law with an Examination of its effect on Land Development,
W75-04845 6G

LAND SPREADING
Development of an Organic Waste Slurry Injector,
W75-04616 5D

Manure Application Guidelines for the Pacific Northwest,
W75-04631 5G

Symposium on Animal Waste Management.
W75-04832 5D

LAND USE
The Brandywine: Five Years After,
W75-04360 6B

The Classification of Some Nigerian Soils,
W75-04390 2G

An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

Correlation of Hydrologic Model Parameters with Changing Land Use as Determined from Aerial Photographs,
W75-04448 4C

A Balanced Approach to Resource Extraction and Creative Land Development Associated with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

Environmental Consequences of Land Use in Arid and Semiarid Areas,
W75-04514 6G

An Economic Analysis of Agricultural Land Use Practices to Control Water Quality,
W75-04526 5G

Investigation of Land Use of Northern Megalopolis Using ERTS-1 Imagery,
W75-04726 7C

Bergen County Sewer Authority V. Hackensack Meadowlands Development Commission (Seeking Declaratory Judgment that Plaintiff not Subject to Land Use Regulations of Defendant in Constructing Addition to Sewage Plant).
W75-04780 6E

A Survey of Federal and Mississippi Environmental Law with an Examination of its effect on Land Development,
W75-04845 6G

LAND USES
The Urban Region Plan: Saint John, (New Brunswick), Urban Region Impact Study.
W75-04756 6B

LANDFILLS
Organic Compounds Entering Ground Water from a Landfill,
W75-04573 5B

Will Current Research Answer Today's Problems at the Sanitary Landfill.,
W75-04800 5B

LANDSCAPING
A Balanced Approach to Resource Extraction and Creative Land Development Associated with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

LAW ENFORCEMENT
Montgomery Environmental Coalition, Et Al. V. Fri, Et Al. (Seeking Declaratory Relief from Further Sewer Hookups on Potomac).
W75-04591 5G

LAW OF THE SEA
A Brief Historical Survey of Freedom of the Seas,
W75-04648 6E

Jurisdiction in National Waters,
W75-04650 6E

The Blockade 'Exception' To Territorial Water Jurisdiction,
W75-04766 6E

African Attitudes Toward the Law of the Sea,
W75-04771 6E

LEACHATE
Organic Compounds Entering Ground Water from a Landfill,
W75-04573 5B

LEACHING
Nitrogen Release Associated with the Decrease in Soil Organic Matter in Newly Cultivated Soils,
W75-04367 5B

The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

The Combined Effects of Infiltration and Redistribution on Leaching,
W75-04606 2G

LEAD
Deposition of Water and Cations on Artificial Foliar Collectors in Fir Krummholz of New England Mountains,
W75-04471 2K

LEAF WATER POTENTIAL
Changes in Transpiration, Net Carbon Dioxide Assimilation and Leaf Water Potential Resulting from Application of Hydrostatic Pressure to Roots of Intact Pepper Plants,
W75-04399 3F

LEASES
Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale Offshore Mississippi, Alabama, and Florida, Volume 4, (Final Environmental Statement),
W75-04589 5G

Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale, Offshore Mississippi, Alabama, and Florida, Volume 5, (Final Environmental Statement),
W75-04590 5G

LEGAL ASPECTS
Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

Used Oil Law in the United States and Europe,
W75-04575 5G

Economic Disincentives for Pollution Control: Legal, Political, and Administrative Disincentives,
W75-04576 5G

Zahn, ET AL. V. International Paper Co. (Class Action Seeking Damages from Discharges),
W75-04588 6E

Effect of Feedlot Laws and Climate on Open Feedlot Waste Management,
W75-04630 5D

Engineering a Victory for the Environment: A Citizen's Guide to the U.S. Army Corps of Engineers,
W75-04755 6G

The Marine Environment and Toxic Substances (When was the Last Time You had a Good Swordfish Steak),
W75-04768 6E

Union of Concerned Scientists V. Atomic Energy Comm'n. (Review of Orders of AEC Licensing Nuclear Powerplant).
W75-04775 6E

In Re Highway US-24, in Bloomfield Township, Oakland County (Highway Condemnation Proceeding).
W75-04776 6E

Incorporated Village of Cornwall V. Environmental Protection Administration of the City of New York (Village Seeking Annulment of Withdrawal of Conditional Approval for Interconnection with Aqueduct from Upstate Watershed and Issuance of Final Approval of Application).
W75-04781 6E

Hendrix, Et Al. V. Creel, Et Al. (Action for Injunction to Compel Municipal Corporation to Clear and Maintain Ditch).
W75-04782 6E

Philosophy on Livestock Waste Regulation,
W75-04838 5G

Arkansas State Game and Fish Comm'n. v. Eubank (Suit Enjoin Proposed Partial Fish Kill).
W75-04844 6E

LEGISLATION
Complying with Discharge Regulations,
W75-04431 5G

Coastal Mapping Act,
W75-04582 6E

Coastal Resources Management and Conservation Report Published,
W75-04583 2L

International Environmental Bibliographies--Environmental Legislation--North America.
W75-04594 6G

Amending the Act of July 4, 1955, as Amended, Relating to the Construction of Irrigation Distribution Systems.
W75-04597 6E

Aquatic Plant Control.
W75-04599 6E

Authorization for Secretary of Interior to Acquire Additional Wetlands.
W75-04651 6E

A Bill to Assure Safe Drinking Water.
W75-04652 6E

Soil Conservation--Administration of Departments and Conservancy Districts.
W75-04773 6E

Waterworks Department in Certain Cities.
W75-04774 6E

Water Pollution--Liquid Wastes (As Amended).
W75-04777 5G

Amelioration of Effects of Oil Spills.
W75-04779 5G

Jurisdiction of Submerged Lands--Guam, the Virgin Islands and American Samoa.
W75-04783 6E

Offshore Oil Drilling at Santa Barbara, Part 1,
W75-04784 6E

Amending the National Environmental Policy Act of 1969, to Provide for a National Environmental Data System.
W75-04785 6E

Nueces River Project, Texas, Part 1.
W75-04786 6E

Authorizing the Secretary of the Interior to Construct, Operate, and Maintain the East Greenacres Unit, Rathdrum Prairie Project, Idaho, and for Other Purposes.
W75-04787 6E

Interim Nuclear Licensing.
W75-04788 6E

Authorizing the City of Sherman, Tex., to Construct a Barrier in Denison Dam (Lake Texoma) Red River, Tex. and Okla., for the Purpose of Providing a Municipal and Industrial Water Supply.
W75-04789 6E

LETHAL LIMIT
Environmental Requirements and Pollution Tolerance of Freshwater Diatoms,
W75-04563 5C

LEVEES
Flood Plain Information: Shunganunga Creek, Topeka, Kansas.
W75-04751 4A

LIAPUNOV DIRECT METHOD
On the Vulnerability of Ecosystems Disturbed by Man,
W75-04521 5C

LIGNINS
Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

LIMNOLOGY
Temperature Dynamics in Dimictic Lakes,
W75-04705 2H

LINCOLN DRAW (KAN)
Flood Plain Information: Big Creek, Chetolah Creek and Lincoln Draw, Hays, Kansas.
W75-04749 4A

LINEAR PROGRAMMING
An Economic Analysis of Agricultural Land Use Practices to Control Water Quality,
W75-04526 5G

Demand for Irrigation: A Case Study of Government Tube-Wells in Uttar Pradesh,
W75-04529 6D

LIQUID PRECIPITATION
About Vertical Gradients of Liquid Precipitation in Mountains,
W75-04668 2B

LIQUID WASTES
Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

Water Pollution--Liquid Wastes (As Amended).
W75-04777 5G

Solid Adsorbents for Gas and Liquid Treatment,
W75-04826 5D

LITTER
Mechanism of Fire-Induced Water Repellency in Soil,
W75-04515 2G

LITTORAL
Littoral Fish Populations After an Oil Tanker Disaster in the Finnish SW Archipelago,
W75-04487 5C

LIVESTOCK
Farms are Not in the Country Any More,
W75-04546 5D

Control of Pollution from Animal Feedlots and Reuse of Animal Wastes,
W75-04615 5D

In-The-Building Oxidation Ditches for Livestock Wastes,
W75-04643 5D

Philosophy on Livestock Waste Regulation,
W75-04838 5G

LOCAL GOVERNMENTS
Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

ASCE Urban Water Resources Research Program, 1967-1974,
W75-04440 4A

An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

LOCAL PRECIPITATION
Maximum Daily Precipitation in Gorski Kotar and Lika (Yugoslavia) in Relation to the Overflying Air-Stream,
W75-04666 2B

Inadvertent Rain Modification as Indicated by Surface Raincells,
W75-04703 2B

LONGEVITY
Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

LOUISIANA
Final Environmental Statement Related to Construction of River Bend Nuclear Power Station, Units 1 and 2, Gulf States Utilities Company.
W75-04396 5G

Raindrop Characteristics in South Central United States,
W75-04713 2B

LOUISIANA (ST. CHARLES PARISH)
An Ecological Study of a Baldcypress Swamp in St. Charles Parish, Louisiana,
W75-04364 2H

LUBBOCK (TEX)
Nitrogen Mass Balance Determination for Simulated Wastewater Land-Spreading Operations,
W75-04449 5D

LYSIMETERS
Improved Instrumentation for Measuring Melted Precipitation on Windswept Topography,
W75-04655 7B

Lysimeter Experiment Description and Progress Report on Neutron Measurements,
W75-04725 2D

MACROPHYTES
A New Technique for the Study of Epiphytic Algae,
W75-04499 5C

MAGNESIUM
Deposition of Water and Cations on Artificial Foliar Collectors in Fir Krummholz of New England Mountains,
W75-04471 2K

MAINTENANCE
TV Inspections Slash Sewer Costs $300 per Repair,
W75-04830 5G

MANAGEMENT
High-Level Radioactive Waste Management Alternatives.
W75-04402 5D

High-Level Radioactive Waste Management Alternatives - Section 1-3: Summary, Background and Data Base, and Evaluation Methodology.
W75-04403 5D

High-Level Radioactive Waste Management Alternatives - Section 4: Geologic Disposal.
W75-04404 5D

High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

Flood Hazard Reports: Tools for Resource Planning and Management,
W75-04432 4A

Planning, Management and Accountability in Water Resources Research,
W75-04439 6B

A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

Adoption of Network Techniques in the Planning and Execution of Irrigation and Power Projects,
W75-04533 3F

Energy Needed to Manage Animal Waste.
W75-04554 5D

Simulation and Statistical Quality Control for Water Pollution Abatement,
W75-04557 5G

EPA Efforts to End Feedlot Manure Pollution Criticized,
W75-04585 5G

Tailor Made Confinement Barn,
W75-04617 5D

Swine Waste Management Systems,
W75-04629 5D

Management of Swine Waste by a Lagoon System,
W75-04632 5D

The Problem of Organization of a Coastal Coordinating Computer Center,
W75-04732 7C

Planning for Water Quality in the Bear River System in the State of Utah.
W75-04757 5G

Water-Distribution Research and Applied Development Needs.
W75-04763 6B

Routine Surveillance Alternatives for Water Quality Management,
W75-04803 5A

Amounts, Composition, and Management of Feedlot Runoff,
W75-04835 5D

MAPPING
Areal Rainfall Analysis by Computer,
W75-04687 7C

MAPS
Coastal Mapping Act,
W75-04582 6E

Physiographically Adjusted Precipitation-Frequency Maps,
W75-04672 2B

MARINE ALGAE
Comparative Photosynthetic Capacities of Intertidal Algae Under Exposed and Submerged Conditions,
W75-04524 5C

MARINE GEOLOGY
High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

MARKETABLE EFFLUENT PERMITS
An Evaluation of Marketable Effluent Permit Systems,
W75-04571 5G

MARYLAND
Tenth Annual Report, Program Activities, July 1, 1973 - June 30, 1974.
W75-04654 9D

Flood Plain Information: (Patuxent River) Western Branch (Folly, Lottsford and Vald Hill Br.), Prince Georges County, Maryland.
W75-04754 4A

MARYLAND (PATUXENT ESTUARY)
Abundance, Diversity and Seasonal Patterns of Estuarine Fish Populations,
W75-04485 5C

MASS WASTING
Soil Erosion and Sediment Transport from Gullies,
W75-04707 2J

MASSACHUSETTS
Final Environmental Statement Related to the Proposed Pilgrim Nuclear Power Station Unit 2 Boston Edison Company.
W75-04397 5G

Particulate Matter at the Sediment-Water Interface in Coastal Environments,
W75-04497 2L

MASSACHUSETTS (BUZZARDS BAY)
Benthic Community Respiration Near the Woods Hole Sewage Outfall,
W75-04503 5C

MASSACHUSETTS (NARRAGANSETT BAY)
Petroleum Hydrocarbons in Narragansett Bay: I. Survey of Hydrocarbons in Sediments and Clams (Mercenaria Mercenaria),
W75-04477 5B

Petroleum Hydrocarbons in Narragansett Bay: II. Chemical and Isotopic Analysis,
W75-04478 5B

MATHEMATICAL MODELS
The Development of a Mathematical Model to Predict Runoff Water Quality from Watersheds,
W75-04551 5B

Optimal Weighting Function in Water Quality Modeling,
W75-04614 5B

Computation of Air Flow Over Mountains in Statically Stable Situations,
W75-04663 2B

Evaluation Problem of Storm Water Routing Mathematical Models,
W75-04708 5D

Small Parametric Model of the Precomputation of Meteorological Fields on the Basis of Complete Equations and Its Energetic Analogs,
W75-04736 7C

Estimate of Heat Fluxes on the Subjacent Surface (According to Data from Synoptic Analysis),
W75-04737 7C

A Small-Parameter Model of Circulation in an Homogeneous Baroclinic Ocean,
W75-04738 2L

Simple Albedo Feedback Models of the Icecaps,
W75-04794 2C

MATHEMATICAL PROGRAMMING
Control Strategy Development Study, San Francisco Wastewater Master Plan,
W75-04352 5D

MAXIMUM PROBABLE FLOOD
Flood Plain Information -- Williamson Creek, Austin, Texas.
W75-04747 4A

Flood Plain Information -- Goose Creek, Baytown, Texas.
W75-04750 4A

MEAN HIGH WATER LINE
Coastal Mapping Act,
W75-04582 6E

MEASUREMENT
Temperature Measurements and Internal Waves in Senaca Lake, New York,
W75-04400 2H

Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

Radiation Dosimetry,
W75-04414 5C

Deficiencies in Measured Snow Precipitation in a Mountainous Area in Norway,
W75-04684 2C

The Problem of Selecting an Optimum Frequency for a Measuring Generator in Determining the Value of the Hydrophysical Parameter with a Given Accuracy,
W75-04735 7B

A Critical Examination of the Turbulence Instrument used in the Marsta Micro-Meteorological Field Project,
W75-04795 7B

MECHUNK CREEK (VA)
Flood Plain Information: Mechunk Creek, Albemarle County, Virginia.
W75-04752 4A

MELBOURNE (AUST)
Living City, (Melbourne, Australia, Review of Operations, 1972-73).
W75-04762 3D

MERCUROUS PERCHLORATE
Solubility Studies of Metallic Mercury in Pure Water at Various Temperatures,
W75-04815 5A

MERCURY
The Effects of Mercuric Chloride Upon Respiration in Congeria Leucophaeta,
W75-04472 5C

Mercury in Aquatic Systems: Methylation, Oxidation-Reduction, and Bioaccumulation,
W75-04570 5B

Mercury in Food: A Scientific Status Summary by the Institute of Food Technologists' Expert Panel on Food Safety and Nutrition,
W75-04579 5C

Solubility Studies of Metallic Mercury in Pure Water at Various Temperatures,
W75-04815 5A

MESQUITE
Wood Boring Insect Infestations in Relation to Mesquite Control Practices,
W75-04380 3B

METABOLISM
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

Production Ecology of Two Caribbean Marine Ecosystems: II. Metabolism and Energy Flow,
W75-04480 5C

METALLIC MERCURY
Solubility Studies of Metallic Mercury in Pure Water at Various Temperatures,
W75-04815 5A

METALS
Sources of Metals in New York City Wastewater,
W75-04805 5B

Trace Metals in Wastewater Effluents,
W75-04806 5B

METEORIC WATER
Lysimeter Experiment Description and Progress Report on Neutron Measurements,
W75-04725 2D

METEOROLOGY
Automation of the Collection and Analysis of Scientific Information in the Problem of the Interaction of the Atmosphere and Ocean,
W75-04729 2B

Software for the Sigma-S,
W75-04731 7C

Small Parametric Model of the Precomputation of Meteorological Fields on the Basis of Complete Equations and Its Energetic Analogs,
W75-04736 7C

Estimate of Heat Fluxes on the Subjacent Surface (According to Data from Synoptic Analysis),
W75-04737 7C

A Critical Examination of the Turbulence Instrument used in the Marsta Micro-Meteorological Field Project,
W75-04795 7B

METHANE BACTERIA
Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. I. Field Observations,
W75-04469 5C

Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. II. Inhibition Experiments,
W75-04470 5C

METHODOLOGY
A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

A Regional Model of the Future Demand For Transportation: The Case of Barge Transportation,
W75-04520 6A

METHYLMERCURY
Mercury in Aquatic Systems: Methylation, Oxidation-Reduction, and Bioaccumulation,
W75-04570 5B

MICE
Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

MICHIGAN
In Re Highway US-24, in Bloomfield Township, Oakland County (Highway Condemnation Proceeding).
W75-04776 6E

Water Pollution--Liquid Wastes (As Amended).
W75-04777 5G

Sampling of Variable, Waste-Migration Patterns in Ground Water,
W75-04799 5B

MICRODENSITOMETERS
Water Quality by Photographic Analysis,
W75-04814 5A

MICROGRAPHS (THREE DIMENSIONAL)
Method for the Construction of Three-Dimensional Electron Micrographs,
W75-04394 5A

MICROMETEOROLOGY
Micrometeorological Measurements for Pesticide Drift Studies,
W75-04714 5B

MILKING MACHINE COMPRESSOR
Mechanical Aeration of a Waste Disposal Manure Pit,
W75-04841 5D

MINE DRAINAGE
Acid Mine Water, A Bibliography,
W75-04625 5G

MINE WASTES
Method for Treatment of Coal Washery Waters,
W75-04463 5D

A Balanced Approach to Resource Extraction and Creative Land Development Associated with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

MINNESOTA
Asbestiform Amphibole Minerals: Detection and Measurement of High Concentrations in Municipal Water Supplies,
W75-04818 5A

MISSISSIPPI
Raindrop Characteristics in South Central United States,
W75-04713 2B

A Survey of Federal and Mississippi Environmental Law with an Examination of its effect on Land Development,
W75-04845 6G

MISSISSIPPI RIVER
Final Environmental Statement Related to Construction of River Bend Nuclear Power Station, Units 1 and 2, Gulf States Utilities Company.
W75-04396 5G

MISSOURI
Inadvertent Rain Modification as Indicated by Surface Raincells,
W75-04703 2B

MODEL STUDIES
Study of Subsurface Flow Into Mountain Streams as Related to Topography and Partial (Variable) Source Areas,
W75-04357 4D

The Varying Source Area of Streamflow from Upland Basins,
W75-04358 4D

Supersonic Aircraft and the Ozone Layer,
W75-04393 5A

Recipient Radiation Exposure - Circulatory Support Systems,
W75-04419 5C

Development of an Air Pollution Model for the San Francisco Bay Area. Third Semi annual Report to the National Science Foundation.
W75-04421 5A

Correlation of Hydrologic Model Parameters with Changing Land Use as Determined from Aerial Photographs,
W75-04448 4C

A Balanced Approach to Resource Extraction and Creative Land Development Associated

with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

Notes--Workshop on Computer-Aided Design and Simulation of Waste Treatment Systems,
W75-04518 5D

A Regional Model of the Future Demand For Transportation: The Case of Barge Transportation,
W75-04520 6A

On the Vulnerability of Ecosystems Disturbed by Man,
W75-04521 5C

An Operational Framework for Coastal Zone Management Planning.
W75-04558 6A

An Evaluation of Marketable Effluent Permit Systems,
W75-04571 5G

Model for Predicting Plant Yield as Influenced by Water Use,
W75-04609 2I

Nonpoint Agricultural Pollution: Status of Assessment Methodology,
W75-04645 5B

Isotopic and Chemical Considerations in Radiocarbon Dating of Groundwater Within the Arid Tucson Basin, Arizona,
W75-04647 7B

A Hybrid Computer Simulation Model for Predicting the Effects of the Areal Distribution of Precipitation on Runoff Characteristics,
W75-04692 2B

The Coalescence of Water Drops,
W75-04728 1A

Automation of the Collection and Analysis of Scientific Information in the Problem of the Interaction of the Atmosphere and Ocean,
W75-04729 2B

Reconstructing the Vertical Profile of Humidity on the Basis of the Vertical Profile of Temperature,
W75-04741 2B

Applicability of Control Strategies to the Activated Sludge Wastewater Treatment Process,
W75-04822 5D

MOHAWK RIVER (NY)

An Evaluation of Marketable Effluent Permit Systems,
W75-04571 5G

MOISTURE

Relative Influence of Moisture-Aeration and Nutrients on Vegetation and Black Spruce Growth in Northern Ontario,
W75-04837 2I

MOISTURE CONTENT

The Effect of Initial Moisture Content and Infiltration Quantity of Redistribution of Soil Water,
W75-04517 2G

A Nondestructive Method of Following Moisture Content and Temperature Changes in Soils Using Thermistors,
W75-04605 2G

Effects of Fertilizer and Available Moisture on the Yield and N and P Content of Wheat and on Soil Nutrients,
W75-04628 3F

Atmospheric Moisture Parameterization,
W75-04724 2B

MOJAVE DESERT

Phenological Events and Their Environmental Triggers in Mojave Desert Ecosystems,
W75-04385 2I

MOMENTUM EQUATION

An Alternative Formulation of the Problem of Density Jump,
W75-04797 8B

MONITORING

The Unreliability of Tile Effluent for Monitoring Subsurface Nitrate-Nitrogen Losses from Soils,
W75-04438 5B

Acid-Iron Waste as a Factor Affecting the Distribution and Abundance of Zooplankton in the New York Bight: II. Spatial Variations in the Field and Implications for Monitoring Studies,
W75-04574 5B

Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

Routine Surveillance Alternatives for Water Quality Management,
W75-04803 5A

MONTANA

Atmospheric Water Resources Management Program - Bridger Range Cloud Seeding Experiment,
W75-04721 3B

MONTANA (GALLATIN RIVER)

Suspended Solids Carried by the Gallatin River of Southwestern Montana: Amounts Carried During Spring Runoff,
W75-04501 2J

MOOUNTAINS

Methods for the Study of Laws for the Distribution of Precipitation in Medium-High Mountains (Illustrated by the Vitim River Basin),
W75-04669 2B

MOSQUITO LARVAE

Studies on the Effectiveness of the Guppy Poecilia Reticulata in Controlling Culex Pipiens S.L.:I. Laboratory Experiments on Predation Behavior, (In Japanese),
W75-04382 5G

MOTORS (OUTBOARD)

The Effects of the Interaction of Outboard Motors with the Aquatic Environment: A Review,
W75-04816 5C

MOUNTAINS

Improved Instrumentation for Measuring Melted Precipitation on Windswept Topography,
W75-04655 7B

Precipitation Measurements by Means of Storage Gauges with Stereo and Horizontal Orifices in the Baye De Montreux Watershed,
W75-04656 7B

Snow Survey and Methods for Snow Storage Estimation in Mountain River Basins of the Soviet Union,
W75-04659 2C

A Possibility of Airflow - Precipitation Regime Investigations,
W75-04660 2B

Rainfall at the Hohenpeissenberg and the Weather Situation,
W75-04662 2B

Computation of Air Flow Over Mountains in Statically Stable Situations,
W75-04663 2B

Distribution of Precipitation in the Sognefjord Region,
W75-04665 2B

About Vertical Gradients of Liquid Precipitation in Mountains,
W75-04668 2B

Relation of Orographic Winter Precipitation Patterns to Meteorological Parameters,
W75-04670 2

The Characteristic Changes of the Amount of Precipitation in Connection with Altitude in the Mountainous Areas of Yugoslavia,
W75-04673 2B

Distribution of Precipitation in Mountainous Areas of West Pakistan,
W75-04674 2B

Precipitation in Taiwan Mountainous Areas,
W75-04675 2B

Orographic Influences on the Distribution of Precipitation,
W75-04676 2B

Influence of Orography on the Share of Precipitation in the East Alpine High Mountains,
W75-04679 2B

Precipitation Estimates from Meteorological Satellite Data,
W75-04685 2B

MULTI-LEVEL PROGRAMMING

An Operational Framework for Coastal Zone Management Planning.
W75-04558 6A

MULTIPLE-PURPOSE PROJECTS

Authorizing the Secretary of the Interior to Construct, Operate, and Maintain the Touchet Division, Walla Walla Project, Oregon-Washington, and for Other Purposes.
W75-04790 6E

MULTIPLE-PURPOSE RESERVOIRS

A Two-Dimensional Multi-Stage Programming Model: With Application to Reservoir Systems,
W75-04523 4A

Computer Use for River Regulation,
W75-04531 4A

Optimal Operation of Multiple Reservoir System,
W75-04532 4A

MULTIPLE REGRESSION ANALYSIS

Demand for Irrigation: A Case Study of Government Tube-Wells in Uttar Pradesh,
W75-04529 6D

MULTIPLE RESERVOIR SYSTEMS
Optimal Operation of Multiple Reservoir System,
W75-04532 4A

MUNICIPAL WASTES
More Than a Myriad.
W75-04829 5D

MUNICIPAL WATER
Recovery of Potable Water From Sanitary Waste Using Solid Wastes and Refuse as a Heat Source,
W75-04458 5D

Asbestiform Amphibole Minerals: Detection and Measurement of High Concentrations in Municipal Water Supplies,
W75-04818 5A

Sewage Treatment in the Potteries,
W75-04823 5D

MUSSELS (FRESHWATER)
Vertical Distribution of Freshwater Mussels (Pelecypoda, Unionidae) in Southwestern Finland,
W75-04486 2I

MUTATIONS
Radiation Biophysics,
W75-04415 5C

NATIONAL ENVIRONMENTAL POLICY ACT
EPA to Issue Impact Statements on Some Regulatory Actions,
W75-04586 5G

Amending the National Environmental Policy Act of 1969, to Provide for a National Environmental Data System.
W75-04785 6E

Interim Nuclear Licensing.
W75-04788 6E

NAVIGABLE WATERS
Permit Provisions Adopted for Ocean Water Activity,
W75-04587 5G

NEBRASKA
The Design of a Livestock Water Distribution System--Large Scale,
W75-04527 3F

Reducing Feedlot Nitrates in Your Ground Water,
W75-04547 5B

NEEDLE GROWTH (PINES)
Fascicle Density and Needle Growth Responses of Red Pine to Water Supply Over Two Seasons,
W75-04424 2I

NETWORK DESIGN
Spectra of Precipitation Series in Mountainous Regions,
W75-04682 7A

The use of the Modified Time Series Analysis Technique for The Determination of Areal Precipitation Accuracies,
W75-04683 2B

NETWORKS
Some Characteristics of Hawaiian High-Intensity Rainfall,
W75-04442 2B

A Two-Dimensional Multi-Stage Programming Model: With Application to Reservoir Systems,
W75-04523 4A

Adoption of Network Techniques in the Planning and Execution of Irrigation and Power Projects,
W75-04533 3F

NEUTRON ABSORPTION
Lysimeter Experiment Description and Progress Report on Neutron Measurements,
W75-04725 2D

NEUTRON ACTIVATION ANALYSIS
Identification and Evaluation of Water Tracers Amenable to Post-Sampling Neutron Activation Analysis,
W75-04355 5A

NEUTRON PROBES
The Effect of Soil Texture and Density on the Neutron and Density Probe Calibration for Some Tropical Soils,
W75-04549 2G

NEVADA
Numerical Simulation of Unsteady Flow Hydraulics of Truckee River,
W75-04444 6A

NEW GUINEA
A Hydrological Assessment of Precipitation in the Western Highlands of New Guinea,
W75-04690 2B

NEW HAMPSHIRE
Deposition of Water and Cations on Artificial Foliar Collectors in Fir Krummholz of New England Mountains,
W75-04471 2K

NEW JERSEY
Farms are Not in the Country Any More,
W75-04546 5D

Bergen County Sewer Authority V. Hackensack Meadowlands Development Commission (Seeking Declaratory Judgment that Plaintiff not Subject to Land Use Regulations of Defendant in Constructing Addition to Sewage Plant).
W75-04780 6E

NEW YORK
Temperature Measurements and Internal Waves in Senaca Lake, New York,
W75-04400 2H

An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

An Evaluation of Marketable Effluent Permit Systems,
W75-04571 5G

Zahn, ET AL. V. International Paper Co. (Class Action Seeking Damages from Discharges),
W75-04588 6E

Diurnal Variations in Cloud Condensation Nuclei,
W75-04711 2B

NEW YORK BIGHT
Acid-Iron Waste as a Factor Affecting the Distribution and Abundance of Zooplankton in the New York Bight: II. Spatial Variations in the Field and Implications for Monitoring Studies,
W75-04574 5B

NEW YORK CITY (NY)
Sources of Metals in New York City Wastewater,
W75-04805 5B

NEW ZEALAND
The use of the Modified Time Series Analysis Technique for The Determination of Areal Precipitation Accuracies,
W75-04683 2B

NIGERIA
The Classification of Some Nigerian Soils,
W75-04390 2G

NIGERIA (SAMARU)
Pattern of Water Availability and Water Requirement for Grain Sorghum Production at Samaru, Nigeria,
W75-04384 3F

NILE RIVER VALLEY
River Regime With Special Reference to River Nile,
W75-04706 2E

NITRATE-NITROGEN
The Unreliability of Tile Effluent for Monitoring Subsurface Nitrate-Nitrogen Losses from Soils,
W75-04438 5B

NITRATES
Nitrogen Release Associated with the Decrease in Soil Organic Matter in Newly Cultivated Soils,
W75-04367 5B

The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

Reducing Feedlot Nitrates in Your Ground Water,
W75-04547 5B

Methods of Removing Nitrates From Water,
W75-04626 5D

NITRIFICATION
Distribution of Different Forms of Nitrogen in Some Desert Soils,
W75-04373 2G

Effectiveness of Two Nitrification Inhibitors for Anhydrous Ammonia Under Irrigated and Dryland Conditions,
W75-04425 5G

NITRILOTRIACETIC ACID
Trickling Filtration of a Waste Containing NTA,
W75-04427 5D

NITRITES
Methods of Removing Nitrates From Water,
W75-04626 5D

NITROGEN
Distribution of Different Forms of Nitrogen in Some Desert Soils,
W75-04373 2G

Supersonic Aircraft and the Ozone Layer,
W75-04393 5A

Electrochemical Process for Nutrient Removal,
W75-04446 5D

Chemicals and Allied Products, (Literature Review),
W75-04474 5G

Methods of Removing Nitrates From Water,
W75-04626 5D

NITROGEN

Effects of Fertilizer and Available Moisture on the Yield and N and P Content of Wheat and on Soil Nutrients,
W75-04628 3F

Ammonia Desorption by Diffused Aeration,
W75-04812 5D

NITROGEN COMPOUNDS
Nutrient Enrichment of Groundwater from Septic Tank Disposal Systems,
W75-04758 5C

NITROGEN FIXATION
Nitrogen Fixation (Acetylene Reduction) by Phytoplankton in Green Bay, Lake Michigan, in Relation to Nutrient Concentrations,
W75-04498 5C

NITROGEN MASS BALANCE
Nitrogen Mass Balance Determination for Simulated Wastewater Land-Spreading Operations,
W75-04449 5D

NITTANY VALLEY (PA)
Controls on the Quality Variations of Some Carbonate Spring Waters,
W75-04710 2F

NON-STRUCTURAL ALTERNATIVES
Flood Plain Information -- Williamson Creek, Austin, Texas.
W75-04747 4A

Flood Plain Information - Cedar Bayou, Houston Metropolitan Area, Texas.
W75-04748 4A

NONPOINT POLLUTION (AGRICULTURAL)
Nonpoint Agricultural Pollution: Status of Assessment Methodology,
W75-04645 5B

NORTH AMERICA
International Environmental Bibliographies--Environmental Legislation--North America.
W75-04594 6G

NORTH CAROLINA
Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

NORTH TYGER RIVER (SC)
Correlation of Hydrologic Model Parameters with Changing Land Use as Determined from Aerial Photographs,
W75-04448 4C

NORWAY
Orographic Influences on Distribution of Precipitation,
W75-04664 2B

Deficiencies in Measured Snow Precipitation in a Mountainous Area in Norway,
W75-04684 2C

NORWAY (SALSVATN LAKE)
Salsvatn, A Lake with Old Sea Water,
W75-04500 2H

NORWAY (SOGNEFJORD REGION)
Distribution of Precipitation in the Sognefjord Region,
W75-04665 2B

NUCLEAR ENERGY
Nuclear Techniques in Medical Science,
W75-04412 5A

Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

Population Radiation Exposure,
W75-04420 5C

NUCLEAR POWERPLANTS
Final Environmental Statement Related to the Proposed Clinton Power Station Units 1 and 2, Illinois Power Company.
W75-04395 5G

Final Environmental Statement Related to Construction of River Bend Nuclear Power Station, Units 1 and 2, Gulf States Utilities Company.
W75-04396 5G

Final Environmental Statement Related to the Proposed Pilgrim Nuclear Power Station Unit 2 Boston Edison Company.
W75-04397 5G

Union of Concerned Scientists V. Atomic Energy Comm'n. (Review of Orders of AEC Licensing Nuclear Powerplant).
W75-04775 6E

Interim Nuclear Licensing.
W75-04788 6E

NUCLEAR WASTES
The Disposal of Radioactive Wastes Into the Sea: Some International Legal Considerations,
W75-04769 6E

NUCLEATION
Diurnal Variations in Cloud Condensation Nuclei,
W75-04711 2B

An Assessment of Warm Fog - Nucleation, Control, and Recommended Research,
W75-04717 2B

NUMERICAL ANALYSIS
Error in Interpolation and Choice of the Range of Discreteness in Measurements in a Hydrophysical Field,
W75-04734 7A

NUTRIENT EXCHANGE
Internal Waves as Causative Mechanisms of Island Mass Effects,
W75-04481 5C

NUTRIENT REMOVAL
Electrochemical Process for Nutrient Removal,
W75-04446 5D

Nutrient Recovery: New Concept in Waste Handling,
W75-04620 5D

NUTRIENTS
Effect of Qualities of Irrigation Water and Fertilizers on Soil Properties, Yield and Nutrient Uptake by Wheat,
W75-04482 3F

On the Vulnerability of Ecosystems Disturbed by Man,
W75-04521 5C

New Aerobic Process Turns Waste to Nutrients,
W75-04619 5D

Relative Influence of Moisture-Aeration and Nutrients on Vegetation and Black Spruce Growth in Northern Ontario,
W75-04837 2I

NUTRITION
Mercury in Food: A Scientific Status Summary by the Institute of Food Technologists' Expert Panel on Food Safety and Nutrition,
W75-04579 5C

OAHU (H.I.)
Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

OCEAN CIRCULATION
A Small-Parameter Model of Circulation in an Homogeneous Baroclinic Ocean,
W75-04738 2L

OCEAN CURRENTS
Rotating Hydraulics of Strait and Sill Flows,
W75-04716 2L

OCEANOGRAPHIC METHODS
Contact (Oil) Water Determination in Terrestrial-Waters Using an Oceanographic Method,
W75-04502 5A

OCEANOGRAPHY
High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

Automation of the Collection and Analysis of Scientific Information in the Problem of the Interaction of the Atmosphere and Ocean,
W75-04729 2B

Automated System for Measurement, Collection and Processing of Hydrometeorological Data Aboard Scientific Research Vessels of the Gugms (Sigma-S),
W75-04730 7C

Software for the Sigma-S,
W75-04731 7C

A System of Automated Processing of Deep Water Hydrological Information,
W75-04733 7C

The Problem of the Influence of Ocean Currents on Free Internal Gravity Waves,
W75-04739 2L

OCEANS
High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

Permit Provisions Adopted for Ocean Water Activity,
W75-04587 5G

A Brief Historical Survey of Freedom of the Seas,
W75-04648 6E

Chemical and Physical Characterization of Tar Samples from the Marine Environment,
W75-04718 5A

The International Seabed Regime: Proposals and Prospects for Realization,
W75-04767 6E

The Marine Environment and Toxic Substances (When was the Last Time You had a Good Swordfish Steak),
W75-04768 6E

The Law of Maritime Oil Spills,
W75-04770 6E

ODORS
Microbiological Production of Geosmin,
W75-04561 5D

OHIO
New Aerobic Process Turns Waste to Nutrients,
W75-04619 5D

OHIO RIVER
A Regional Model of the Future Demand For Transportation: The Case of Barge Transportation,
W75-04520 6A

OIL
Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale, Offshore Mississippi, Alabama, and Florida, Volume 5, (Final Environmental Statement),
W75-04590 5G

OIL INDUSTRY
Offshore Oil Drilling at Santa Barbara, Part 1,
W75-04784 6E

OIL-LAYER THICKNESS
Determination of the Thickness of Petroleum Films on Water,
W75-04723 5A

OIL POLLUTION
Methods for Elimination of Oil Slicks,
W75-04455 5G

Petroleum Hydrocarbons in Narragansett Bay: I. Survey of Hydrocarbons in Sediments and Clams (Mercenaria Mercenaria),
W75-04477 5B

Contact (Oil) Water Determination in Terrestrial-Waters Using an Oceanographic Method,
W75-04502 5A

Determination of the Molecular Solubility of Navy Oils in Water,
W75-04722 5A

Determination of the Thickness of Petroleum Films on Water,
W75-04723 5A

The Law of Maritime Oil Spills,
W75-04770 6E

OIL SPILLS
Methods for Elimination of Oil Slicks,
W75-04455 5G

Littoral Fish Populations After an Oil Tanker Disaster in the Finnish SW Archipelago,
W75-04487 5C

An Examination of Alternative Methods for Employing Booms to Contain Oil Spills in Navy Harbors,
W75-04720 5G

Determination of the Thickness of Petroleum Films on Water,
W75-04723 5A

Amelioration of Effects of Oil Spills.
W75-04779 5G

OIL WASTES
Used Oil Law in the United States and Europe,
W75-04575 5G

Measurement of Hydrocarbons in Water: Application to Cases of Surface Water Pollution,
W75-04709 5A

OIL WELLS
Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale Offshore Mississippi, Alabama, and Florida, Volume 4, (Final Environmental Statement),
W75-04589 5G

OKLAHOMA
Authorizing the City of Sherman, Tex., to Construct a Barrier in Denison Dam (Lake Texoma) Red River, Tex. and Okla., for the Purpose of Providing a Municipal and Industrial Water Supply.
W75-04789 6E

OLIGOTROPHIC SEAS
Internal Waves as Causative Mechanisms of Island Mass Effects,
W75-04481 5C

ON-SITE DATA COLLECTIONS
Energy Budget Measurements Over Three Cover Types in Eastern Arizona,
W75-04383 2I

ON-SITE INVESTIGATIONS
Virological Studies in Water Systems: Natural Occurrence of Reoviruses and Their Inactivation by Physical and Chemical Agents,
W75-04821 5F

OPEN CHANNEL FLOW
Simplified Application of Palmer-Bowlus Flow Meters,
W75-04802 8B

OPERATING POLICY
Optimal Operation of Multiple Reservoir System,
W75-04532 4A

OPERATION AND MAINTENANCE
Tertiary Treatment: The Wrong Solution to a Non-Problem,
W75-04811 5D

OPERATIONS
Instrumentation Improves Water Treatment Plant Operation,
W75-04434 5F

Optimal Operation of Multiple Reservoir System,
W75-04532 4A

Tentative Criteria for Design, Construction and Operation of the Batch Type Pasveer Oxidation Ditch System for the Treatment of Animal Wastes,
W75-04636 5D

OPERATIONS RESEARCH
Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

OPTIMIZATION
Control Strategy Development Study, San Francisco Wastewater Master Plan,
W75-04352 5D

Instrumentation Improves Water Treatment Plant Operation,
W75-04434 5F

Optimal Operation of Multiple Reservoir System,
W75-04532 4A

Parameter Identification in Distributed Systems Using a Digital Simulation Language: An Extension of PDEL,
W75-04540 6A

An Operational Framework for Coastal Zone Management Planning.
W75-04558 6A

Optimal Weighting Function in Water Quality Modeling,
W75-04614 5B

ORDINANCES
Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

OREGON
Subsurface Sewage Disposal and Contamination of Ground Water in East Portland, Oregon,
W75-04798 5B

ORGANIC COMPOUNDS
Organic Compounds Entering Ground Water from a Landfill,
W75-04573 5B

Measurement of Hydrocarbons in Water: Application to Cases of Surface Water Pollution,
W75-04709 5A

ORGANIC WASTES
Recycle Organic Wastes as Feed for Meat Animals.
W75-04556 5D

Comparative Changes in Soil-Physical Properties Induced by Admixtures of Manures from Various Domestic Animals,
W75-04602 2G

Settling Basin Design for Raceway Fish Production Systems,
W75-04646 5D

ORGANIC WASTES *WASTE TREATMENT
Changing from Dumping to Recycling. Part 2. Organic Wastes,
W75-04642 5D

OROGRAPHY
Orographic Influences on Distribution of Precipitation,
W75-04664 2B

Relation of Orographic Winter Precipitation Patterns to Meteorological Parameters,
W75-04670 2

Physiographically Adjusted Precipitation-Frequency Maps,
W75-04672 2B

The Characteristic Changes of the Amount of Precipitation in Connection with Altitude in the Mountainous Areas of Yugoslavia,
W75-04673 2B

Precipitation in Taiwan Mountainous Areas,
W75-04675 2B

Orographic Influences on the Distribution of Precipitation,
W75-04676 2B

Water Yield as an Index of Lee and Windward Topographic Effects on Precipitation,
W75-04678 2B

Influence of Orography on the Share of Precipitation in the East Alpine High Mountains,
W75-04679 2B

OROGRAPHY

Study of Orographic Effect on Optimum Number of Raingauges,
W75-04681 7A

OSMOSIS
Determination of the Molecular Solubility of Navy Oils in Water,
W75-04722 5A

OUTFALL SEWERS
Design, Construction and Launching of a Submarine Outfall Sewer at Whitstable,
W75-04536 5D

More Than a Myriad.
W75-04829 5D

OVERFLOW
Control Strategy Development Study, San Francisco Wastewater Master Plan,
W75-04352 5D

OWNERSHIP OF BEDS
The International Seabed Regime: Proposals and Prospects for Realization,
W75-04767 6E

OXIDATION
Method for Electrosanitizing Waste Water,
W75-04464 5D

OXIDATION DITCH
A Prototype System to Renovate and Recycle Swine Wastes Hydraulically,
W75-04542 5D

OXIDATION LAGOONS
A Prototype System to Renovate and Recycle Swine Wastes Hydraulically,
W75-04542 5D

Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

Tentative Criteria for Design, Construction and Operation of the Batch Type Pasveer Oxidation Ditch System for the Treatment of Animal Wastes,
W75-04636 5D

In-The-Building Oxidation Ditches for Livestock Wastes,
W75-04643 5D

OXYGEN
Supersonic Aircraft and the Ozone Layer,
W75-04393 5A

OXYGEN-18
Relative Rates of Flow of the Negro and Solimoes Rivers (Determined) Through O18 Concentrations, (In Porteguese),
W75-04495 2E

OXYGEN SAG
Oxygen Sag and Stream Purification, (Literature Review),
W75-04849 5B

OXYGENATION
Environment, Energy Costs Suggest Oxygen Activated Sludge as Wastewater Treatment Approach,
W75-04827 5D

OZONE
Supersonic Aircraft and the Ozone Layer,
W75-04393 5A

Closed-Loop Ozone Generating and Contacting System,
W75-04461 5D

Kinetics in Ozone Treatment of Secondary Sewage Effluents, (In Japanese),
W75-04831 5D

PACIFIC NORTHWEST U.S.
Manure Application Guidelines for the Pacific Northwest,
W75-04631 5G

PAKISTAN
Distribution of Precipitation in Mountainous Areas of West Pakistan,
W75-04674 2B

PALMER-BOWLUS FLUMES
Simplified Application of Palmer-Bowlus Flow Meters,
W75-04802 8B

PARKS
An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

PATENTS
Process and Apparatus for Separating Water From Non-Volatile Solutes,
W75-04451 3A

Winch-Driven Irrigation Apparatus,
W75-04452 3F

Floating Wave Barrier,
W75-04453 8A

Apparatus for the Filtration and Biological Purification of Contaminated Water,
W75-04454 5D

Methods for Elimination of Oil Slicks,
W75-04455 5G

Sewage Treatment System,
W75-04456 5D

Water Clarification with Nitrogen-Heterocyclic Phosphonic Acids,
W75-04457 5D

Recovery of Potable Water From Sanitary Waste Using Solid Wastes and Refuse as a Heat Source,
W75-04458 5D

Vertical, Multistage-Flash, Falling Film Column for Distilling Brine,
W75-04459 3A

Self-Reconditioning Filter Apparatus for Continuous Removal of Solids From a Stream of Liquid,
W75-04460 5D

Closed-Loop Ozone Generating and Contacting System,
W75-04461 5D

Method for Treatment of Coal Washery Waters,
W75-04463 5D

Method for Electrosanitizing Waste Water,
W75-04464 5D

Method and Apparatus for Producing a Distillate,
W75-04465 3A

Hydrate Forming in Water Desalination,
W75-04466 3A

Inflatable Barriers for Watercourses,
W75-04467 8A

PATH OF POLLUTANTS
The Use of Chironomid Pupal Exuviae for Characterizing Streams,
W75-04371 5B

The Unreliability of Tile Effluent for Monitoring Subsurface Nitrate-Nitrogen Losses from Soils,
W75-04438 5B

Fluoride Concentrations in Two Pacific Coast Inlets-An Indication of Industrial Contamination,
W75-04473 5B

Dissolved and Particulate Humic Acid in an East Coast Estuary,
W75-04504 5B

Mercury in Aquatic Systems: Methylation, Oxidation-Reduction, and Bioaccumulation,
W75-04570 5B

Micrometeorological Measurements for Pesticide Drift Studies,
W75-04714 5B

Lysimeter Experiment Description and Progress Report on Neutron Measurements,
W75-04725 2D

Subsurface Sewage Disposal and Contamination of Ground Water in East Portland, Oregon,
W75-04798 5B

Sampling of Variable, Waste-Migration Patterns in Ground Water,
W75-04799 5B

PATUXENT RIVER (MD)
Flood Plain Information: (Patuxent River) Western Branch (Folly, Lottsford and Vald Hill Br.), Prince Georges County, Maryland.
W75-04754 4A

PEAK DISCHARGE
Flood Plain Information -- Goose Creek, Baytown, Texas.
W75-04750 4A

PENNSYLVANIA
The Brandywine: Five Years After,
W75-04360 6B

Recycle Organic Wastes as Feed for Meat Animals.
W75-04556 5D

Controls on the Quality Variations of Some Carbonate Spring Waters,
W75-04710 2F

PEPPER PLANTS
Changes in Transpiration, Net Carbon Dioxide Assimilation and Leaf Water Potential Resulting from Application of Hydrostatic Pressure to Roots of Intact Pepper Plants,
W75-04399 3F

PERCOLATE CHARACTERISTICS
Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

PERCOLATION
Biodegradability of a Carboxymethyloxysuccinate Detergent Builder,
W75-04426 5D

Micromorphology. A Discipline at the Chemistry-Minerology Interface,
W75-04608 2G

PERFORMANCE
Slats in the Southwest,
W75-04621 5D

Applicability of Control Strategies to the Activated Sludge Wastewater Treatment Process,
W75-04822 5D

PERMITS
An Evaluation of Marketable Effluent Permit Systems,
W75-04571 5G

Bergen County Sewer Authority V. Hackensack Meadowlands Development Commission (Seeking Declaratory Judgment that Plaintiff not Subject to Land Use Regulations of Defendant in Constructing Addition to Sewage Plant).
W75-04780 6E

Interim Nuclear Licensing.
W75-04788 6E

PESTICIDE DRIFT
Micrometeorological Measurements for Pesticide Drift Studies,
W75-04714 5B

Micrometeorological Measurements for Pesticide Drift Studies,
W75-04714 5B

PESTICIDES
Ecological History of DDT in Arizona,
W75-04387 5C

PHENOLOGY
Phenological Events and Their Environmental Triggers in Mojave Desert Ecosystems,
W75-04385 2I

PHOSPHATES
Electrochemical Process for Nutrient Removal,
W75-04446 5D

PHOSPHORUS
An Economic Analysis of Agricultural Land Use Practices to Control Water Quality,
W75-04526 5G

Effects of Fertilizer and Available Moisture on the Yield and N and P Content of Wheat and on Soil Nutrients,
W75-04628 3F

Nutrient Enrichment of Groundwater from Septic Tank Disposal Systems,
W75-04758 5C

PHOTOCHEMISTRY
Supersonic Aircraft and the Ozone Layer,
W75-04393 5A

PHOTOSYNTHESIS
Comparative Photosynthetic Capacities of Intertidal Algae Under Exposed and Submerged Conditions,
W75-04524 5C

PHREATOPHYTES
Management of Phreatophyte and Riparian Vegetation for Maximum Multiple Use Values,
W75-04379 3B

PHYSICAL PROPERTIES
Pacific Northwest Laboratory Annual Report for 1973 to the USAEC Division of Biomedical and Environmental Research Part 4. Physical and Analytical Sciences,
W75-04410 5C

PHYTOPLANKTON
Nitrogen Fixation (Acetylene Reduction) by Phytoplankton in Green Bay, Lake Michigan, in Relation to Nutrient Concentrations,
W75-04498 5C

PILOT PLANTS
Fluidized-Bed Sludge Incinerator Design,
W75-04428 5D

Granular Filters for Tertiary Wastewater Treatment,
W75-04429 5D

PINE TREES (RED)
Fascicle Density and Needle Growth Responses of Red Pine to Water Supply Over Two Seasons,
W75-04424 2I

PIPE FLOW
Bifurcation Characteristic Reynolds Number,
W75-04715 8B

PIPELINES
Design, Construction and Launching of a Submarine Outfall Sewer at Whitstable,
W75-04536 5D

An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

Bifurcation Characteristic Reynolds Number,
W75-04715 8B

Special Methods Open Storm-Blocked Pipeline.
W75-04808 8C

PLANNING
Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

Water: Canadian Needs and Resources,
W75-04359 6B

Flood Hazard Reports: Tools for Resource Planning and Management,
W75-04432 4A

Planning, Management and Accountability in Water Resources Research,
W75-04439 6B

An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

The Design of a Livestock Water Distribution System--Large Scale,
W75-04527 3F

Environmental Values and Water Quality Planning,
W75-04530 5G

Adoption of Network Techniques in the Planning and Execution of Irrigation and Power Projects,
W75-04533 3F

Special Flood Hazard Information: Clear Creek, Brazoria, Fort Bend, Galveston and Harris Counties, Texas.
W75-04743 4A

Planning for Water Quality in the Bear River System in the State of Utah.
W75-04757 5G

Living City, (Melbourne, Australia, Review of Operations, 1972-73).
W75-04762 3D

Economics, (Literature Review),
W75-04846 5G

PLANT GROWTH
Model for Predicting Plant Yield as Influenced by Water Use,
W75-04609 2I

Effect of Root Pruning on Water Relations and Growth of Cotton,
W75-04613 2I

PLANT GROWTH REGULATORS
Response of Herbaceous Vegetation to Felling of Alligator Juniper,
W75-04376 2I

PLANT POPULATIONS
Irrigation, Row width, and Plant Population in Relation to Growth Characteristics of Two Soybean Varieties,
W75-04369 3F

PLASTIC PIPES
Updating Aging Sewers Without Trenching,
W75-04828 5D

PLUMES
Sampling of Variable, Waste-Migration Patterns in Ground Water,
W75-04799 5B

PNEUMATIC TRANSPORTATION
Pneumatic Transportation of Manure,
W75-04641 5D

POECILIA-RETICULATA
Studies on the Effectiveness of the Guppy Poecilia Reticulata in Controlling Culex Pipiens S.L.:I. Laboratory Experiments on Predation Behavior, (In Japanese),
W75-04382 5G

POLAND
Influence of Heated Discharge Waters from the 'Skawina' Electric Power Station on the Ichthyofauna of the Rivers Skawinka and Vistula,
W75-04491 5C

POLITICAL ASPECTS
Jurisdiction of Submerged Lands--Guam, the Virgin Islands and American Samoa.
W75-04783 6E

POLLUTANT IDENTIFICATION
Identification and Evaluation of Water Tracers Amenable to Post-Sampling Neutron Activation Analysis,
W75-04355 5A

Supersonic Aircraft and the Ozone Layer,
W75-04393 5A

Method for the Construction of Three-Dimensional Electron Micrographs,
W75-04394 5A

Pacific Northwest Laboratory Annual Report for 1973 to the USAEC Division of Biomedical and Environmental Research Part 4. Physical and Analytical Sciences,
W75-04410 5C

Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

Nuclear Techniques in Medical Science,
W75-04412 5A

Torulopsis Austromarina Sp. Nov. A Yeast Isolated from the Antartic Ocean,
W75-04436 5A

Petroleum Hydrocarbons in Narragansett Bay: II. Chemical and Isotopic Analysis,
W75-04478 5B

Contact (Oil) Water Determination in Terrestrial-Waters Using an Oceanographic Method,
W75-04502 5A

Measurement of Hydrocarbons in Water: Application to Cases of Surface Water Pollution,
W75-04709 5A

Chemical and Physical Characterization of Tar Samples from the Marine Environment,
W75-04718 5A

Determination of the Thickness of Petroleum Films on Water,
W75-04723 5A

Water Quality by Photographic Analysis,
W75-04814 5A

Solubility Studies of Metallic Mercury in Pure Water at Various Temperatures,
W75-04815 5A

Wastewater analysis and its Relation to Company Profits,
W75-04817 5A

Asbestiform Amphibole Minerals: Detection and Measurement of High Concentrations in Municipal Water Supplies,
W75-04818 5A

Analyzing Biological Properties of Wastes,
W75-04842 5A

POLLUTION ABATEMENT

Methods for Elimination of Oil Slicks,
W75-04455 5G

Simulation and Statistical Quality Control for Water Pollution Abatement,
W75-04557 5G

An Examination of Alternative Methods for Employing Booms to Contain Oil Spills in Navy Harbors,
W75-04720 5G

The Law of Maritime Oil Spills,
W75-04770 6E

POLLUTION CHARGES (TAXES)

An Evaluation of Marketable Effluent Permit Systems,
W75-04571 5G

Economic Disincentives for Pollution Control: Legal, Political, and Administrative Disincentives,
W75-04576 5G

POLLUTION CONTROL

International Environmental Bibliographies--Environmental Legislation--North America.
W75-04594 6G

POLLUTION SOURCES

International Environmental Bibliographies--Environmental Legislation--North America.
W75-04594 6G

POLYARTHRA-REMATA

The Effect of Cooling Water Discharges on Zooplankton in a Bay of Lake Malaren,
W75-04496 5C

POLYMERS

Turbidity Removal Using Polymers and Activated Carbon,
W75-04820 5F

POLYVINYL ALCOHOL

Polyvinyl Alcohol as a Stabilizer of Surface Soil,
W75-04607 2G

POPULATION EXPOSURE

Pacific Northwest Laboratory Annual Report for 1973 to the USAEC Division of Biomedical and Environmental Research Part 4. Physical and Analytical Sciences,
W75-04410 5C

POTABLE WATER

Nitrogen Release Associated with the Decrease in Soil Organic Matter in Newly Cultivated Soils,
W75-04367 5B

The World's Largest Desalting Complex--A Report on Twenty Years Experience,
W75-04422 3A

Recovery of Potable Water From Sanitary Waste Using Solid Wastes and Refuse as a Heat Source,
W75-04458 5D

A Bill to Assure Safe Drinking Water.
W75-04652 6E

Are we Ready for a Closed System of Water Supply, Treatment, and Reuse - Technology vs. Psychology,
W75-04761 5D

POTASSIUM

Deposition of Water and Cations on Artificial Foliar Collectors in Fir Krummholz of New England Mountains,
W75-04471 2K

POULTRY

Indiana Poultrymen are Composting Poultry Manure,
W75-04552 5D

Sewage-Grown Algae as a Feedstuff for Chicks,
W75-04618 5D

PRECIPITATION (ATMOSPHERIC)

Hail and Its Distribution,
W75-04604 2C

Analysis of Snow Cover Distribution from Aerophotography Data Over Experimental Mountain Basin of Varzob River,
W75-04658 7B

Snow Survey and Methods for Snow Storage Estimation in Mountain River Basins of the Soviet Union,
W75-04659 2C

A Possibility of Airflow - Precipitation Regime Investigations,
W75-04660 2B

Characteristics of Precipitation in the Scottish Highlands,
W75-04661 2B

Rainfall at the Hohenpeissenberg and the Weather Situation,
W75-04662 2B

Orographic Influences on Distribution of Precipitation,
W75-04664 2B

Distribution of Precipitation in the Sognefjord Region,
W75-04665 2B

Maximum Daily Precipitation in Gorski Kotar and Lika (Yugoslavia) in Relation to the Overflying Air-Stream,
W75-04666 2B

About Vertical Gradients of Liquid Precipitation in Mountains,
W75-04668 2B

Methods for the Study of Laws for the Distribution of Precipitation in Medium-High Mountains (Illustrated by the Vitim River Basin),
W75-04669 2B

Relation of Orographic Winter Precipitation Patterns to Meteorological Parameters,
W75-04670 2

The Distribution of Precipitation in Some Mountainous Canadian Watersheds,
W75-04671 2B

Physiographically Adjusted Precipitation-Frequency Maps,
W75-04672 2B

The Characteristic Changes of the Amount of Precipitation in Connection with Altitude in the Mountainous Areas of Yugoslavia,
W75-04673 2B

Distribution of Precipitation in Mountainous Areas of West Pakistan,
W75-04674 2B

Precipitation in Taiwan Mountainous Areas,
W75-04675 2B

Orographic Influences on the Distribution of Precipitation,
W75-04676 2B

Extreme Thunderstorm Rainfall in the Intermountain Western United States,
W75-04677 2B

Water Yield as an Index of Lee and Windward Topographic Effects on Precipitation,
W75-04678 2B

Influence of Orography on the Share of Precipitation in the East Alpine High Mountains,
W75-04679 2B

On the Problem of Vertical Distribution of Precipitation, Especially in Areas with Great Height Differences,
W75-04680 2B

Study of Orographic Effect on Optimum Number of Raingauges,
W75-04681 7A

Spectra of Precipitation Series in Mountainous Regions,
W75-04682 7A

The use of the Modified Time Series Analysis Technique for The Determination of Areal Precipitation Accuracies,
W75-04683 2B

Deficiencies in Measured Snow Precipitation in a Mountainous Area in Norway,
W75-04684 2C

Precipitation Estimates from Meteorological Satellite Data,
W75-04685 2B

Factors Affecting the Estimate of Areal Average Summer and Winter Precipitation in a Small Catchment of the Swiss Prealps,
W75-04686 2B

Computerized Calculation of Areal Precipitation and Its Accuracy,
W75-04688 7C

A Hydrological Assessment of Precipitation in the Western Highlands of New Guinea,
W75-04690 2B

A Hybrid Computer Simulation Model for Predicting the Effects of the Areal Distribution of Precipitation on Runoff Characteristics,
W75-04692 2B

Estimating Areal Rainfall by Fitting Surfaces to Irregularly Spaced Data,
W75-04693 7C

PRECOAT FILTERS

Precoat Filtration on Rotary Vacuum Filter (Precoat-Filtration Auf Dem Vakuum-Trommelfilter),
W75-04810 5D

PREDATION

Studies on the Effectiveness of the Guppy Poecilia Reticulata in Controlling Culex Pipiens S.L.:I. Laboratory Experiments on Predation Behavior, (In Japanese),
W75-04382 5G

PRELIMINARY TREATMENT

Sewage Treatment in the Potteries,
W75-04823 5D

PRESSURIZED WATER REACTORS

Final Environmental Statement Related to the Proposed Pilgrim Nuclear Power Station Unit 2 Boston Edison Company.
W75-04397 5G

PRINCIPAL COMPONENT ANALYSIS

Water Yield as an Index of Lee and Windward Topographic Effects on Precipitation,
W75-04678 2B

PROBABLE MAXIMUM PRECIPITATION

Maximum Daily Precipitation in Gorski Kotar and Lika (Yugoslavia) in Relation to the Overflying Air-Stream,
W75-04666 2B

Extreme Thunderstorm Rainfall in the Intermountain Western United States,
W75-04677 2B

Some Intra-Storm Characteristics of High-Intensity Rainfall Bursts,
W75-04689 2B

PRODUCTION

Production Ecology of Two Caribean Marine Ecosystems: I. Physical Environment and Fauna,
W75-04479 5C

PROFESSIONAL PERSONNEL

Directory of Environmental Life Scientists,
W75-04468 6G

PROJECT FEASIBILITY

Planning, Management and Accountability in Water Resources Research,
W75-04439 6B

Environmental Values and Water Quality Planning,
W75-04530 5G

PROJECT PLANNING

Engineering a Victory for the Environment: A Citizen's Guide to the U.S. Army Corps of Engineers,
W75-04755 6G

PROJECT POST-EVALUATION

Planning, Management and Accountability in Water Resources Research,
W75-04439 6B

PROJECT PURPOSES

Planning, Management and Accountability in Water Resources Research,
W75-04439 6B

PROJECTS

Adoption of Network Techniques in the Planning and Execution of Irrigation and Power Projects,
W75-04533 3F

PROJECTS PLANNING

Differences Between Planned and Actual Costs and Benefits in Small Watershed Development,
W75-04433 4D

PROTEINS

Sewage-Grown Algae as a Feedstuff for Chicks,
W75-04618 5D

PSYCHOLOGICAL ASPECTS

Are we Ready for a Closed System of Water Supply, Treatment, and Reuse - Technology vs. Psychology,
W75-04761 5D

PUBLIC BENEFITS

Nueces River Project, Texas, Part 1.
W75-04786 6E

PUBLIC HEALTH

High-Level Radioactive Waste Management Alternatives - Section 1-3: Summary, Background and Data Base, and Evaluation Methodology.
W75-04403 5D

Medical Grade Plutonium-238 From Americium-241,
W75-04418 5C

Population Radiation Exposure,
W75-04420 5C

Design, Construction and Launching of a Submarine Outfall Sewer at Whitstable,
W75-04536 5D

PUBLIC TRUST DOCTRINE

Hendrix, Et Al. V. Creel, Et Al. (Action for Injunction to Compel Municipal Corporation to Clear and Maintain Ditch).
W75-04782 6E

PUDDLING

Oversaturation Method for Preparing Saturation Extracts for Salinity Appraisal,
W75-04392 2G

PULP WASTES

Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

PUMPING

Groundwater Pumpage in Northern Illinois, 1960-1970,
W75-04727 4B

PYRHELIOMETERS

Sensitivity Distribution Along the Strips of Compensation Pyrheliometers,
W75-04796 7B

RACEWAY FISH PRODUCTION SYSTEMS

Settling Basin Design for Raceway Fish Production Systems,
W75-04646 5D

RADAR

Area Precipitation Measurement with X-Band Radar from a Mountain North of the Alps,
W75-04691 7B

RADIATION

Radiation Physics,
W75-04413 5C

Radiation Dosimetry,
W75-04414 5C

Radiation Biophysics,
W75-04415 5C

The Problem of Calculating Cloud Cover in Calculations of Long Wave Radiational Characteristics of the Atmosphere,
W75-04740 2B

Sensitivity Distribution Along the Strips of Compensation Pyrheliometers,
W75-04796 7B

RADIATION EFFECTS

Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

RADIATION EXPOSURE

Pacific Northwest Laboratory Annual Report for 1973 to the USAEC Division of Biomedical and Environmental Research Part 4. Physical and Analytical Sciences,
W75-04410 5C

RADIOACTIVE DATING

Isotopic and Chemical Considerations in Radiocarbon Dating of Groundwater Within the Arid Tucson Basin, Arizona,
W75-04647 7B

RADIOACTIVE EFFECTS

Radiation Physics,
W75-04413 5C

RADIOACTIVE WASTE DISPOSAL
Retrievable Surface Storage Facility, Alternative Concepts Engineering Studies.
W75-04401 5D

High-Level Radioactive Waste Management Alternatives.
W75-04402 5D

High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

High-Level Radioactivity Waste Management Alternatives - Section 8: Extraterrestrii Disposal,
W75-04408 5D

High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

The Disposal of Radioactive Wastes Into the Sea: Some International Legal Considerations,
W75-04769 6E

RADIOACTIVITY
Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

Retrievable Surface Storage Facility, Alternative Concepts Engineering Studies.
W75-04401 5D

High-Level Radioactive Waste Management Alternatives - Section 4: Geologic Disposal.
W75-04404 5D

High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

Radiation Dosimetry,
W75-04414 5C

RADIOACTIVITY EFFECT
Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

RADIOACTIVITY EFFECTS
Radiation Biophysics,
W75-04415 5C

RADIOISOTOPES
Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

Medical Grade Plutonium-238 From Americium-241,
W75-04418 5C

Recipient Radiation Exposure - Circulatory Support Systems,
W75-04419 5C

RAILROADS
Railroad and Canal Companies--Eminent Domain (As Amended),
W75-04580 6E

RAIN GAGES
Some Characteristics of Hawaiian High-Intensity Rainfall,
W75-04442 2B

Precipitation Measurements by Means of Storage Gauges with Stereo and Horizontal Orifices in the Baye De Montreux Watershed,
W75-04656 7B

Study of Orographic Effect on Optimum Number of Raingauges,
W75-04681 7A

RAINCELLS
Inadvertent Rain Modification as Indicated by Surface Raincells,
W75-04703 2B

RAINDROP SIZE
Some Characteristics of Hawaiian High-Intensity Rainfall,
W75-04442 2B

RAINDROPS
Raindrop Characteristics in South Central United States,
W75-04713 2B

RAINFALL
Phenological Events and Their Environmental Triggers in Mojave Desert Ecosystems,
W75-04385 2I

Rainfall Patterns and General Atmospheric Circulation,
W75-04513 2B

Polyvinyl Alcohol as a Stabilizer of Surface Soil,
W75-04607 2G

Extreme Thunderstorm Rainfall in the Intermountain Western United States,
W75-04677 2B

Areal Rainfall Analysis by Computer,
W75-04687 7C

Area Precipitation Measurement with X-Band Radar from a Mountain North of the Alps,
W75-04691 7B

Estimating Areal Rainfall by Fitting Surfaces to Irregularly Spaced Data,
W75-04693 7C

Frequent Occurrence of Heavy Rainfall Along the North Side to the Low-Level Jet Stream in the Baiu Season,
W75-04704 2B

The Objective Analysis of Relative Humidity,
W75-04791 2B

Surface Water Data of the Llano Texas Region, Project Sanguine.
W75-04847 2E

RAINFALL INTENSITY
Some Characteristics of Hawaiian High-Intensity Rainfall,
W75-04442 2B

Some Intra-Storm Characteristics of High-Intensity Rainfall Bursts,
W75-04689 2B

A Hydrological Assessment of Precipitation in the Western Highlands of New Guinea,
W75-04690 2B

RAINFALL SIMULATORS
Infiltration for Three Rangeland Soil-Vegetation Complexes,
W75-04377 2G

RAINGAGES
Evaporation Losses from Storage Gauges,
W75-04657 7B

RANGE MANAGEMENT
Response of Herbaceous Vegetation to Felling of Alligator Juniper,
W75-04376 2I

Wood Boring Insect Infestations in Relation to Mesquite Control Practices,
W75-04380 3B

Economics of Fertilizer Application on Range and Meadow Sites in Utah,
W75-04388 2I

RATING CURVES
Simplified Application of Palmer-Bowlus Flow Meters,
W75-04802 8B

RAYLEIGH NUMBER
Channel Flow Driven by a Stationary Thermal Source,
W75-04793 8B

REAMING
Updating Aging Sewers Without Trenching,
W75-04828 5D

RECESSION LIMB
Synthesis of Hydrograph Recessions Adjusted for Evapotranspiration Losses,
W75-04712 2E

RECLAIMED WATER
Are we Ready for a Closed System of Water Supply, Treatment, and Reuse - Technology vs. Psychology,
W75-04761 5D

RECLAMATION
The Social Redemption of Pure Garbage,
W75-04553 5D

RECREATION
Environmental Values and Water Quality Planning,
W75-04530 5G

RECYCLING
A Prototype System to Renovate and Recycle Swine Wastes Hydraulically,
W75-04542 5D

Coprology: A Pollution Solution,
W75-04545 5D

The Social Redemption of Pure Garbage,
W75-04553 5D

Energy Needed to Manage Animal Waste.
W75-04554 5D

Perpetual-Motion Recycling, or, Pig Manure Into Fish Food,
W75-04555 5D

Recycle Organic Wastes as Feed for Meat Animals.
W75-04556 5D

Control of Pollution from Animal Feedlots and Reuse of Animal Wastes,
W75-04615 5D

Nutrient Recovery: New Concept in Waste Handling,
W75-04620 5D

Manure Handling Systems for the Future,
W75-04635 5D

Changing from Dumping to Recycling. Part 2. Organic Wastes,
W75-04642 5D

REEDY RIVER (SC)
Correlation of Hydrologic Model Parameters with Changing Land Use as Determined from Aerial Photographs,
W75-04448 4C

REGIME
River Regime With Special Reference to River Nile,
W75-04706 2E

REGIONAL ANALYSIS
The Urban Region Plan: Saint John, (New Brunswick), Urban Region Impact Study.
W75-04756 6B

REGIONAL DEVELOPMENT
Water: Canadian Needs and Resources,
W75-04359 6B

An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

The Urban Region Plan: Saint John, (New Brunswick), Urban Region Impact Study.
W75-04756 6B

Nueces River Project, Texas, Part 1.
W75-04786 6E

REGULATION
Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

An In-Depth Look at Federal Pollution Controls,
W75-04544 5G

Used Oil Law in the United States and Europe,
W75-04575 5G

Water Quality Management Basin Plans Regulations Adopted,
W75-04584 5G

Permit Provisions Adopted for Ocean Water Activity,
W75-04587 5G

EPA Policy on Injection Wells.
W75-04592 5G

Regulation of Great Lakes Water Levels--Appendix E--Commercial Navigation.
W75-04601 2H

Effect of Feedlot Laws and Climate on Open Feedlot Waste Management,
W75-04630 5D

EPA Preparing to 'Railroad' Through New Pollution Rules Covering Cattle Feedlots,
W75-04639 5G

Union of Concerned Scientists V. Atomic Energy Comm'n. (Review of Orders of AEC Licensing Nuclear Powerplant).
W75-04775 6E

Procedural Methods for Implementing Colorado River Water Conservation Measures.
W75-04778 6E

Amelioration of Effects of Oil Spills.
W75-04779 5G

Bergen County Sewer Authority V. Hackensack Meadowlands Development Commission (Seeking Declaratory Judgment that Plaintiff not Subject to Land Use Regulations of Defendant in Constructing Addition to Sewage Plant).
W75-04780 6E

Philosophy on Livestock Waste Regulation,
W75-04838 5G

REGULATIONS
A Survey of Federal and Mississippi Environmental Law with an Examination of its effect on Land Development,
W75-04845 6G

REMOTE SENSING
Precipitation Estimates from Meteorological Satellite Data,
W75-04685 2B

Area Precipitation Measurement with X-Band Radar from a Mountain North of the Alps,
W75-04691 7B

Investigation of Land Use of Northern Megalopolis Using ERTS-1 Imagery,
W75-04726 7C

REOVIRUSES
Virological Studies in Water Systems: Natural Occurrence of Reoviruses and Their Inactivation by Physical and Chemical Agents,
W75-04821 5F

RESEARCH AND DEVELOPMENT
High-Level Radioactive Waste Management Alternatives - Section 1-3: Summary, Background and Data Base, and Evaluation Methodology.
W75-04403 5D

Pacific Northwest Laboratory Annual Report for 1973 to the USAEC Division of Biomedical and Environmental Research Part 4. Physical and Analytical Sciences,
W75-04410 5C

Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

Nuclear Techniques in Medical Science,
W75-04412 5A

Radiation Physics,
W75-04413 5C

Radiation Dosimetry,
W75-04414 5C

Radiation Biophysics,
W75-04415 5C

Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

Medical Uses of Isotopes,
W75-04417 5C

Medical Grade Plutonium-238 From Americium-241,
W75-04418 5C

Recipient Radiation Exposure - Circulatory Support Systems,
W75-04419 5C

Population Radiation Exposure,
W75-04420 5C

Development of an Air Pollution Model for the San Francisco Bay Area. Third Semi annual Report to the National Science Foundation.
W75-04421 5A

ASCE Urban Water Resources Research Program, 1967-1974,
W75-04440 4A

RESEARCH FACILITIES
Automated System for Measurement, Collection and Processing of Hydrometeorological Data Aboard Scientific Research Vessels of the Gugms (Sigma-S),
W75-04730 7C

RESEARCH PRIORITIES
Planning, Management and Accountability in Water Resources Research,
W75-04439 6B

Water-Distribution Research and Applied Development Needs.
W75-04763 6B

RESERVOIR STORAGE
A Two-Dimensional Multi-Stage Programming Model: With Application to Reservoir Systems,
W75-04523 4A

Expectation and Dispersion Matrices for the Estimation of Distributions Associated with Discrete Reservoirs,
W75-04525 4A

Optimal Operation of Multiple Reservoir System,
W75-04532 4A

RESERVOIRS
Diurnal Temperature Distribution in Small Reservoir,
W75-04443 2H

Sediment Trap Efficiency of Small Reservoirs,
W75-04702 2J

Temperature Dynamics in Dimictic Lakes,
W75-04705 2H

Living City, (Melbourne, Australia, Review of Operations, 1972-73).
W75-04762 3D

RESOURCES DEVELOPMENT
A Compendium of Information, (The Metropolitan Toronto and Region Conservation Authority).
W75-04760 3D

RESPIRATION
The Effects of Mercuric Chloride Upon Respiration in Congeria Leucophaeta,
W75-04472 5C

Benthic Community Respiration Near the Woods Hole Sewage Outfall,
W75-04503 5C

REVIEWS
1971 Annual Review of Literature. Waste Water Treatment Physical and Chemical Methods,
W75-04437 5D

REVIEWS

Chemicals and Allied Products, (Literature Review),
W75-04474 5G

The Effects of the Interaction of Outboard Motors with the Aquatic Environment: A Review,
W75-04816 5C

Economics, (Literature Review),
W75-04846 5G

Effects of Pollution on Freshwater Fish, (Literature Review),
W75-04848 5C

Oxygen Sag and Stream Purification, (Literature Review),
W75-04849 5B

REYNOLDS NUMBER
Bifurcation Characteristic Reynolds Number,
W75-04715 8B

RIO GRANDE RIVER
Comprehensive Plan for Water, Sewer and Storm Drainage in the Lower Rio Grande Valley, (Volume II).
W75-04759 5D

RISK ANALYSIS
A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

RISKS
A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

RIVANNA RIVER (VA)
Flood Plain Information: North Fork Rivanna River, Albemarle County, Virginia.
W75-04745 4A

RIVER BASIN COMMISSIONS
Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

RIVER BASIN DEVELOPMENT
Water Quality Management Basin Plans Regulations Adopted,
W75-04584 5G

RIVER BASINS
Prediction of Drainage Requirements -- Buyuk Menderes River Basin, Turkey,
W75-04534 4A

Planning for Water Quality in the Bear River System in the State of Utah.
W75-04757 5G

RIVER FLOW
River Regime With Special Reference to River Nile,
W75-04706 2E

RIVER REGULATION
Computer Use for River Regulation,
W75-04531 4A

RIVERS
Bill to Establish the Potomac National River in the States of Maryland, Virginia, West Virginia, and the District of Columbia and for Other Purposes.
W75-04772 6E

ROCKY MOUNTAIN REGION
Extreme Thunderstorm Rainfall in the Intermountain Western United States,
W75-04677 2B

ROLOFFIA-ROLOFFI
Remarks on Bionomy of Family Cyprinodontidae (Pisces) with Respect to Dependency of Development of Embryos of Roloffia Foloffi (Ahl., 1938) on the Hardness of the Water, (In German),
W75-04494 2I

ROOKERY BAY (FLA)
Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

ROOT DEVELOPMENT
Some Effects of Subirrigation on Bentgrass During Heat Stress in the Field,
W75-04612 2I

Effect of Root Pruning on Water Relations and Growth of Cotton,
W75-04613 2I

ROOT DISTRIBUTION
Some Effects of Subirrigation on Bentgrass During Heat Stress in the Field,
W75-04612 2I

Effect of Root Pruning on Water Relations and Growth of Cotton,
W75-04613 2I

ROOT SYSTEMS
Effect of Root Pruning on Water Relations and Growth of Cotton,
W75-04613 2I

ROTARY VACUUM FILTER
Precoat Filtration on Rotary Vacuum Filter (Precoat-Filtration Auf Dem Vakuum-Trommelfilter),
W75-04810 5D

ROTATIONAL FLOW
Rotating Hydraulics of Strait and Sill Flows,
W75-04716 2L

ROTENONE
Arkansas State Game and Fish Comm'n. v. Eubank (Suit Enjoin Proposed Partial Fish Kill).
W75-04844 6E

RUNOFF
Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

Suspended Solids Carried by the Gallatin River of Southwestern Montana: Amounts Carried During Spring Runoff,
W75-04501 2J

He Solved His Manure Handling Problem,
W75-04634 5D

Pierced Steel Planking Surfacing for Feedlot Runoff Control,
W75-04644 5D

Amounts, Composition, and Management of Feedlot Runoff,
W75-04835 5D

Surface Water Data of the Llano Texas Region, Project Sanguine.
W75-04847 2E

SAFETY
High-Level Radioactive Waste Management Alternatives - Section 1-3: Summary, Background and Data Base, and Evaluation Methodology.
W75-04403 5D

SAHEL ZONE
Rainfall Patterns and General Atmospheric Circulation,
W75-04513 2B

SALINE WATER
Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04391 2C

Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04507 2G

SALINITY
Effects of Agricultural Acreage Reduction on Water Availability and Salinity in the Upper Colorado River Basin,
W75-04368 6B

The Effect of Salinity and Ionic Equilibrium on Contamination of Arenicola Marina L. (Annelida: Polychaeta) by Cesium-137, (In French),
W75-04489 5C

Influence of Freshwater Dulution on Dynamics of Populations of Builder Crustaceans from Lagoon of Biguglia, Corsica (Corophium Insidiosum C., Tanais Cavolinii M.E., Erichthonius Brasiliensis D.), (In French),
W75-04490 2H

SALMONELLA
Salmonella and Natural Purification of Polluted Waters, (In German),
W75-04578 5C

SALT BALANCE
Water Management Systems,
W75-04538 3F

SALT CREEK
Final Environmental Statement Related to the Proposed Clinton Power Station Units 1 and 2, Illinois Power Company.
W75-04395 5G

SALTS
Salt and Water Movement in Relatively Dry Soil,
W75-04516 2G

Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

Effect of Ration on Manure Salt Content,
W75-04834 5D

SAMPLING
Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

A Leak-Proof Sampling Port in Gas Analyses Studies,
W75-04697 7B

Determination of the Thickness of Petroleum Films on Water,
W75-04723 5A

Routine Surveillance Alternatives for Water Quality Management,
W75-04803 5A

SAN FRANCISCO BAY
Development of an Air Pollution Model for the San Francisco Bay Area. Third Semi annual Report to the National Science Foundation.
W75-04421 5A

SAN JOAQUIN (CALIF)
Methods of Removing Nitrates From Water,
W75-04626 5D

SANDS
Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

Stress-Strain Response for Sand,
W75-04696 8D

SANITARY LANDFILLS
Will Current Research Answer Today's Problems at the Sanitary Landfill.,
W75-04800 5B

SANITARY WASTES
Recovery of Potable Water From Sanitary Waste Using Solid Wastes and Refuse as a Heat Source,
W75-04458 5D

SARDINELLA-AURITA
The Occurrence of Young Sardinella Aurita in the Brackish Water of the Lagoons of Cananeia (Brazil), (In German),
W75-04492 2L

SATELLITES (ARTIFICIAL)
Precipitation Estimates from Meteorological Satellite Data,
W75-04685 2B

Investigation of Land Use of Northern Megalopolis Using ERTS-1 Imagery,
W75-04726 7C

SATURATED SOILS
Oversaturation Method for Preparing Saturation Extracts for Salinity Appraisal,
W75-04392 2G

SATURATION
Oversaturation Method for Preparing Saturation Extracts for Salinity Appraisal,
W75-04392 2G

SAUDI ARABIA
Stabilization of Aeolian Lands in Saudi Arabia's Al Hasa Oasis,
W75-04512 3C

SCHEDULING
Adoption of Network Techniques in the Planning and Execution of Irrigation and Power Projects,
W75-04533 3F

SCIENTIFIC PERSONNEL
Directory of Environmental Life Scientists,
W75-04468 6G

SCOTLAND (HIGHLANDS)
Characteristics of Precipitation in the Scottish Highlands,
W75-04661 2B

SEA WATER
Salsvatn, A Lake with Old Sea Water,
W75-04500 2H

SEABED MINING
The International Seabed Regime: Proposals and Prospects for Realization,
W75-04767 6E

SEALANTS
Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

SEASONAL
Factors Affecting the Estimate of Areal Average Summer and Winter Precipitation in a Small Catchment of the Swiss Prealps,
W75-04686 2B

SEASONAL PATTERNS
Abundance, Diversity and Seasonal Patterns of Estuarine Fish Populations,
W75-04485 5C

SEDIMENT
An Economic Analysis of Agricultural Land Use Practices to Control Water Quality,
W75-04526 5G

SEDIMENT-WATER INTERFACES
Particulate Matter at the Sediment-Water Interface in Coastal Environments,
W75-04497 2L

SEDIMENTATION
A Geophysical and Geological Investigation of Potentially Favorable Areas for Petroleum Exploration in Southeastern Arizona,
W75-04509 2J

Settling Basin Design for Raceway Fish Production Systems,
W75-04646 5D

River Regime With Special Reference to River Nile,
W75-04706 2E

Soil Erosion and Sediment Transport from Gullies,
W75-04707 2J

Coagulation-Filtration Practice as Related to Research.
W75-04825 5D

SEDIMENTS
Petroleum Hydrocarbons in Narragansett Bay: I. Survey of Hydrocarbons in Sediments and Clams (Mercenaria Mercenaria),
W75-04477 5B

Sediment Trap Efficiency of Small Reservoirs,
W75-04702 2J

SEEPAGE
The Rising Water Table in the West Nubarya Area of Egypt,
W75-04363 4B

Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. I. Field Observations,
W75-04469 5C

SEEPAGE CONTROL
Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

SELF PURIFICATION
Salmonella and Natural Purification of Polluted Waters, (In German),
W75-04578 5C

SENECA LAKE (NY)
Temperature Measurements and Internal Waves in Senaca Lake, New York,
W75-04400 2H

SEPARATION TECHNIQUES
High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

Solid Adsorbents for Gas and Liquid Treatment,
W75-04826 5D

SEPTIC TANKS
Biodegradability of a Carboxymethyloxysuccinate Detergent Builder,
W75-04426 5D

Nutrient Enrichment of Groundwater from Septic Tank Disposal Systems,
W75-04758 5C

Subsurface Sewage Disposal and Contamination of Ground Water in East Portland, Oregon,
W75-04798 5B

Sampling of Variable, Waste-Migration Patterns in Ground Water,
W75-04799 5B

Rational Basis for Septic Tank System Design,
W75-04801 5D

Uniform Distribution in Soil Absorption Fields,
W75-04807 5D

SERUM CAPS
A Leak-Proof Sampling Port in Gas Analyses Studies,
W75-04697 7B

SETTLING BASINS
Surge Facility for Wet and Dry Weather Flow Control,
W75-04562 5D

Settling Basin Design for Raceway Fish Production Systems,
W75-04646 5D

Activated Sludge Bulking (In Japanese),
W75-04824 5D

SEWAGE
Comprehensive Plan for Water, Sewer and Storm Drainage in the Lower Rio Grande Valley, (Volume II).
W75-04759 5D

Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

SEWAGE DISPOSAL
Design, Construction and Launching of a Submarine Outfall Sewer at Whitstable,
W75-04536 5D

Rational Basis for Septic Tank System Design,
W75-04801 5D

SEWAGE EFFLUENT
Nitrogen Mass Balance Determination for Simulated Wastewater Land-Spreading Operations,
W75-04449 5D

SEWAGE OUTFALLS
Benthic Community Respiration Near the Woods Hole Sewage Outfall,
W75-04503 5C

SEWAGE TREATMENT
Sewage Treatment System,
W75-04456 5D

SEWAGE TREATMENT

Method for Electrosanitizing Waste Water,
W75-04464 5D

Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

Salmonella and Natural Purification of Polluted Waters, (In German),
W75-04578 5C

Special Methods Open Storm-Blocked Pipeline.
W75-04808 8C

Sewage Treatment in the Potteries,
W75-04823 5D

Kinetics in Ozone Treatment of Secondary Sewage Effluents, (In Japanese),
W75-04831 5D

SEWER REPAIR

TV Inspections Slash Sewer Costs $300 per Repair,
W75-04830 5G

SEWERS

Control Strategy Development Study, San Francisco Wastewater Master Plan,
W75-04352 5D

Living City, (Melbourne, Australia, Review of Operations, 1972-73).
W75-04762 3D

Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

Updating Aging Sewers Without Trenching,
W75-04828 5D

SEWERS SYSTEMS

Evaluation Problem of Storm Water Routing Mathematical Models,
W75-04708 5D

SHORE PROTECTION

Floating Wave Barrier,
W75-04453 8A

SHOWERS

Some Characteristics of Hawaiian High-Intensity Rainfall,
W75-04442 2B

SHUNGANUNGA CREEK (KAN.)

Flood Plain Information: Shunganunga Creek, Topeka, Kansas.
W75-04751 4A

SILICA GELS

Solid Adsorbents for Gas and Liquid Treatment,
W75-04826 5D

SILVERSIDES

The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

SIMULATION ANALYSIS

Numerical Simulation of Unsteady Flow Hydraulics of Truckee River,
W75-04444 6A

Correlation of Hydrologic Model Parameters with Changing Land Use as Determined from Aerial Photographs,
W75-04448 4C

Notes--Workshop on Computer-Aided Design and Simulation of Waste Treatment Systems,
W75-04518 5D

A systems Analysis of Water Quality Survey Design,
W75-04522 5B

Computer Use for River Regulation,
W75-04531 4A

Water Management Systems,
W75-04538 3F

Solution of Simultaneous Partial Differential Equations: An Extension of PDEL,
W75-04539 6A

Parameter Identification in Distributed Systems Using a Digital Simulation Language: An Extension of PDEL,
W75-04540 6A

An Evaluation of Marketable Effluent Permit Systems,
W75-04571 5G

Optimal Weighting Function in Water Quality Modeling,
W75-04614 5B

A Hybrid Computer Simulation Model for Predicting the Effects of the Areal Distribution of Precipitation on Runoff Characteristics,
W75-04692 2B

Unsteady, Unsaturated, N-Dimensional Moisture Flow in Soil: A Computer Simulation Program,
W75-04701 2G

SIMULATION LANGUAGES

Solution of Simultaneous Partial Differential Equations: An Extension of PDEL,
W75-04539 6A

SIMULTANEOUS PARTIAL DIFFERENTIAL EQUATION

Solution of Simultaneous Partial Differential Equations: An Extension of PDEL,
W75-04539 6A

SIMULTATED RAINFALL

Polyvinyl Alcohol as a Stabilizer of Surface Soil,
W75-04607 2G

SITES

Final Environmental Statement Related to the Proposed Clinton Power Station Units 1 and 2, Illinois Power Company.
W75-04395 5G

Final Environmental Statement Related to Construction of River Bend Nuclear Power Station, Units 1 and 2, Gulf States Utilities Company.
W75-04396 5G

Final Environmental Statement Related to the Proposed Pilgrim Nuclear Power Station Unit 2 Boston Edison Company.
W75-04397 5G

SLATS

Slats in the Southwest,
W75-04621 5D

SLUDGE DISPOSAL

Fluidized-Bed Sludge Incinerator Design,
W75-04428 5D

SLURRIES

Development of an Organic Waste Slurry Injector,
W75-04616 5D

SMALL WATERSHEDS

Study of Subsurface Flow Into Mountain Streams as Related to Topography and Partial (Variable) Source Areas,
W75-04357 4D

The Varying Source Area of Streamflow from Upland Basins,
W75-04358 4D

Energy Budget Measurements Over Three Cover Types in Eastern Arizona,
W75-04383 2I

Differences Between Planned and Actual Costs and Benefits in Small Watershed Development,
W75-04433 4D

SNOW

Statistical Considerations About Snow Conditions in the Austrian Alps,
W75-04667 2C

Deficiencies in Measured Snow Precipitation in a Mountainous Area in Norway,
W75-04684 2C

SNOW COURSES

Snow Survey and Methods for Snow Storage Estimation in Mountain River Basins of the Soviet Union,
W75-04659 2C

SNOW COVER

Analysis of Snow Cover Distribution from Aerophotography Data Over Experimental Mountain Basin of Varzob River,
W75-04658 7B

SNOW REMOVAL

Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

SNOW REMOVAL *MAINTENANCE

Manual for Deicing Chemicals: Application Practices,
W75-04567 5G

SNOWFALL

Snow Survey and Methods for Snow Storage Estimation in Mountain River Basins of the Soviet Union,
W75-04659 2C

SNOWMELT

Some Effects of Spring Snowmelt Runoff on Aquatic Invertebrate Populations in a High Moutain Stream,
W75-04450 2I

Improved Instrumentation for Measuring Melted Precipitation on Windswept Topography,
W75-04655 7B

SODIUM

Deposition of Water and Cations on Artificial Foliar Collectors in Fir Krummholz of New England Mountains,
W75-04471 2K

SOIL CHEMICAL PROPERTIES

Micromorphology. A Discipline at the Chemistry-Minerology Interface,
W75-04608 2G

SOIL CHEMISTRY
Micromorphology. A Discipline at the Chemistry-Minerology Interface,
W75-04608 2G

SOIL CLASSIFICATION
The Classification of Some Nigerian Soils,
W75-04390 2G

SOIL CONDITIONS
Effects of Cattle Feedlot Manure on Crop Yields and Soil Conditions,
W75-04833 5D

SOIL DENSITY
The Effect of Soil Texture and Density on the Neutron and Density Probe Calibration for Some Tropical Soils,
W75-04549 2G

SOIL DISPOSAL FIELDS
Subsurface Sewage Disposal and Contamination of Ground Water in East Portland, Oregon,
W75-04798 5B

Rational Basis for Septic Tank System Design,
W75-04801 5D

Uniform Distribution in Soil Absorption Fields,
W75-04807 5D

SOIL FORMATION
The Classification of Some Nigerian Soils,
W75-04390 2G

SOIL LOSS
Raindrop Characteristics in South Central United States,
W75-04713 2B

SOIL MOISTURE
Range Plant Yield and Species Relationships in Natural and Partially Controlled Environments,
W75-04378 2I

The Temperature Profiles of Soil Columns During Infiltration,
W75-04389 2G

The Effect of Initial Moisture Content and Infiltration Quantity of Redistribution of Soil Water,
W75-04517 2G

A Nondestructive Method of Following Moisture Content and Temperature Changes in Soils Using Thermistors,
W75-04605 2G

Simulation of Moisture Transfer in Soils: One-Dimensional Infiltration,
W75-04695 2G

A Method for Measuring First-Stage Soil Water Evaporation in the Field,
W75-04698 2D

Two-Dimensional Water Infiltration from a Trench in Unsaturated Soils,
W75-04700 2G

Unsteady, Unsaturated, N-Dimensional Moisture Flow in Soil: A Computer Simulation Program,
W75-04701 2G

SOIL MOISTURE METERS
A Nondestructive Method of Following Moisture Content and Temperature Changes in Soils Using Thermistors,
W75-04605 2G

SOIL PHYSICAL PROPERTIES
Comparative Changes in Soil-Physical Properties Induced by Admixtures of Manures from Various Domestic Animals,
W75-04602 2G

Stress-Strain Response for Sand,
W75-04696 8D

SOIL PROFILE
The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

SOIL PROFILES
The Temperature Profiles of Soil Columns During Infiltration,
W75-04389 2G

SOIL PROPERTIES
Effect of Qualities of Irrigation Water and Fertilizers on Soil Properties, Yield and Nutrient Uptake by Wheat,
W75-04482 3F

SOIL STABILIZATION
Stabilization of Aeolian Lands in Saudi Arabia's Al Hasa Oasis,
W75-04512 3C

SOIL STRUCTURE
The Classification of Some Nigerian Soils,
W75-04390 2G

SOIL SURFACES
Polyvinyl Alcohol as a Stabilizer of Surface Soil,
W75-04607 2G

SOIL TEMPERATURE
Mechanism of Fire-Induced Water Repellency in Soil,
W75-04515 2G

A Nondestructive Method of Following Moisture Content and Temperature Changes in Soils Using Thermistors,
W75-04605 2G

SOIL TEXTURE
The Effect of Soil Texture and Density on the Neutron and Density Probe Calibration for Some Tropical Soils,
W75-04549 2G

SOIL TREATMENT
Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

SOIL WATER
Use of Leaf Resistance for Predicting Irrigation Scheduling,
W75-04351 3F

The Influence of Soil Water Potential on the Perennial Vegetation of a Desert Arroyo,
W75-04365 2I

Calculation of the Drainage Component of Soil Water Depletion,
W75-04374 2G

Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04391 2C

Oversaturation Method for Preparing Saturation Extracts for Salinity Appraisal,
W75-04392 2G

Polyvinyl Alcohol as a Stabilizer of Surface Soil,
W75-04607 2G

Micromorphology. A Discipline at the Chemistry-Minerology Interface,
W75-04608 2G

A Method for Measuring First-Stage Soil Water Evaporation in the Field,
W75-04698 2D

Feedlot Waste Effects on Soil Conditions and Water Evaporation,
W75-04699 5B

SOIL WATER DEFICIT
Susceptibility of Grain Sorghum to Water Deficit at Three Growth Stages,
W75-04483 3F

SOIL WATER MOVEMENT
Salt and Water Movement in Relatively Dry Soil,
W75-04516 2G

The Combined Effects of Infiltration and Redistribution on Leaching,
W75-04606 2G

Simulation of Moisture Transfer in Soils: One-Dimensional Infiltration,
W75-04695 2G

Two-Dimensional Water Infiltration from a Trench in Unsaturated Soils,
W75-04700 2G

Unsteady, Unsaturated, N-Dimensional Moisture Flow in Soil: A Computer Simulation Program,
W75-04701 2G

SOIL-WATER-PLANT RELATIONSHIPS
Use of Leaf Resistance for Predicting Irrigation Scheduling,
W75-04351 3F

Infiltration for Three Rangeland Soil-Vegetation Complexes,
W75-04377 2G

Range Plant Yield and Species Relationships in Natural and Partially Controlled Environments,
W75-04378 2I

Model for Predicting Plant Yield as Influenced by Water Use,
W75-04609 2I

Effect of Root Pruning on Water Relations and Growth of Cotton,
W75-04613 2I

SOIL WATER POTENTIAL
Evaluation of the Filter Paper Method for Estimating Soil Water Potential,
W75-04506 2G

Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04507 2G

SOILS
Nitrogen Release Associated with the Decrease in Soil Organic Matter in Newly Cultivated Soils,
W75-04367 5B

Water Uptake by Seeds as Affected by Water Stress, Capillary Conductivity, and Seed-Soil Water Contact. I. Experimental Study and, II. Analysis of Experimental Data,
W75-04381 2I

Drainage for Agriculture,
W75-04537 3F

Water Management Systems,
W75-04538 3F

SOLAR ENERGY
Diurnal Temperature Distribution in Small Reservoir,
W75-04443 2H

SOLID ADSORBENTS
Solid Adsorbents for Gas and Liquid Treatment,
W75-04826 5D

SOLID WASTE COLLECTION
An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

SOLID WASTES
Self-Reconditioning Filter Apparatus for Continuous Removal of Solids From a Stream of Liquid,
W75-04460 5D

Will Current Research Answer Today's Problems at the Sanitary Landfill.,
W75-04800 5B

SOLUBILITY
Determination of the Molecular Solubility of Navy Oils in Water,
W75-04722 5A

Solubility Studies of Metallic Mercury in Pure Water at Various Temperatures,
W75-04815 5A

SORGHUM
Use of Leaf Resistance for Predicting Irrigation Scheduling,
W75-04351 3F

SOUTH CAROLINA
Biologic Detection and Control of Water Pollution,
W75-04447 5C

Correlation of Hydrologic Model Parameters with Changing Land Use as Determined from Aerial Photographs,
W75-04448 4C

Fast Fluch System,
W75-04622 5D

SOUTHWEST U.S.
Management of Phreatophyte and Riparian Vegetation for Maximum Multiple Use Values,
W75-04379 3B

SPECIFICATIONS
Universal Design of a 2.5 MGD Universal Desalting Plant, Revised: Volume 1.
W75-04850 3A

SPECTROPHOTOMETRY
Solubility Studies of Metallic Mercury in Pure Water at Various Temperatures,
W75-04815 5A

SPRINGS
Controls on the Quality Variations of Some Carbonate Spring Waters,
W75-04710 2F

SPRINKLER IRRIGATION
Use of Leaf Resistance for Predicting Irrigation Scheduling,
W75-04351 3F

The Combined Effects of Infiltration and Redistribution on Leaching,
W75-04606 2G

ST. LOUIS (MO)
Inadvertent Rain Modification as Indicated by Surface Raincells,
W75-04703 2B

STABILITY
River Regime With Special Reference to River Nile,
W75-04706 2E

STANDARD SAMPLES
Microbiological Production of Geosmin,
W75-04561 5D

STATE POLICIES
An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

STATE POLICY
Aquatic Plant Control.
W75-04599 6E

Waterworks Department in Certain Cities.
W75-04774 6E

In Re Highway US-24, in Bloomfield Township, Oakland County (Highway Condemnation Proceeding).
W75-04776 6E

Bergen County Sewer Authority V. Hackensack Meadowlands Development Commission (Seeking Declaratory Judgment that Plaintiff not Subject to Land Use Regulations of Defendant in Constructing Addition to Sewage Plant).
W75-04780 6E

Hendrix, Et Al. V. Creel, Et Al. (Action for Injunction to Compel Municipal Corporation to Clear and Maintain Ditch).
W75-04782 6E

STATISTICAL METHODS
Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

A Possibility of Airflow - Precipitation Regime Investigations,
W75-04660 2B

Statistical Considerations About Snow Conditions in the Austrian Alps,
W75-04667 2C

STATISTICS
Spectra of Precipitation Series in Mountainous Regions,
W75-04682 7A

STEREO GAGES
Precipitation Measurements by Means of Storage Gauges with Stereo and Horizontal Orifices in the Baye De Montreux Watershed,
W75-04656 7B

STOCHASTIC PROCESSES
Expectation and Dispersion Matrices for the Estimation of Distributions Associated with Discrete Reservoirs,
W75-04525 4A

Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

STOCHASTIC RESERVOIR THEORY
Expectation and Dispersion Matrices for the Estimation of Distributions Associated with Discrete Reservoirs,
W75-04525 4A

STORAGE GAGES
Precipitation Measurements by Means of Storage Gauges with Stereo and Horizontal Orifices in the Baye De Montreux Watershed,
W75-04656 7B

Evaporation Losses from Storage Gauges,
W75-04657 7B

STORAGE REQUIREMENTS
A Method for Determining Peak Flows and Detention Storage Requirements in Urbanizing Areas.
W75-04694 4A

STORAGE TANKS
Surge Facility for Wet and Dry Weather Flow Control,
W75-04562 5D

STORM DRAINS
Evaluation Problem of Storm Water Routing Mathematical Models,
W75-04708 5D

Comprehensive Plan for Water, Sewer and Storm Drainage in the Lower Rio Grande Valley, (Volume II).
W75-04759 5D

STORM RUNOFF
Control Strategy Development Study, San Francisco Wastewater Master Plan,
W75-04352 5D

Study of Subsurface Flow Into Mountain Streams as Related to Topography and Partial (Variable) Source Areas,
W75-04357 4D

The Varying Source Area of Streamflow from Upland Basins,
W75-04358 4D

Water Quality of Storm Runoff from a Texas Beef Feedlot,
W75-04843 5B

STORM SURGES
Surge Facility for Wet and Dry Weather Flow Control,
W75-04562 5D

STORM WATER
Evaluation Problem of Storm Water Routing Mathematical Models,
W75-04708 5D

Sources of Metals in New York City Wastewater,
W75-04805 5B

STRAIN
Stress-Strain Response for Sand,
W75-04696 8D

STRAITS
Rotating Hydraulics of Strait and Sill Flows,
W75-04716 2L

STRAITS OF GIBRALTER
Rotating Hydraulics of Strait and Sill Flows,
W75-04716 2L

STRATIFICATION
Diurnal Temperature Distribution in Small Reservoir,
W75-04443 2H

STRATOSPHERE
Supersonic Aircraft and the Ozone Layer,
W75-04393 5A

STREAM CLASSIFICATION
The Use of Chironomid Pupal Exuviae for Characterizing Streams,
W75-04371 5B

STREAM PURIFICATION
Oxygen Sag and Stream Purification, (Literature Review),
W75-04849 5B

STREAMFLOW
Correlation of Hydrologic Model Parameters with Changing Land Use as Determined from Aerial Photographs,
W75-04448 4C

Water Yield as an Index of Lee and Windward Topographic Effects on Precipitation,
W75-04678 2B

STREET DRAINAGE
Hydraulic Analysis of Winnipeg Sump Inlets,
W75-04804 5D

STREPTOMYCES
Microbiological Production of Geosmin,
W75-04561 5D

STRESS
Stress-Strain Response for Sand,
W75-04696 8D

STRIP MINES
Acid Mine Water, A Bibliography,
W75-04625 5G

SUBFLOOR
Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

SUBIRRIGATION
Some Effects of Subirrigation on Bentgrass During Heat Stress in the Field,
W75-04612 2I

SUBMERGED LANDS ACT
Offshore Oil Drilling at Santa Barbara, Part 1,
W75-04784 6E

SUBSURFACE DRAINAGE
Development of Guidelines for the Design of Subsurface Drainage Systems for Highway Pavement Structural Sections,
W75-04809 8A

SUBSURFACE INVESTIGATIONS
The Rising Water Table in the West Nubarya Area of Egypt,
W75-04363 4B

SUBSURFACE RUNOFF
The Varying Source Area of Streamflow from Upland Basins,
W75-04358 4D

SUBURBAN AREAS
Farms are Not in the Country Any More,
W75-04546 5D

SUGARBEETS
Separation, Dewatering and Disposal of Sugarbeet Transport Water Solids, (Phase I),
W75-04565 5D

SULFATE-REDUCING BACTERIA
Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. I. Field Observations,
W75-04469 5C

Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. II. Inhibition Experiments,
W75-04470 5C

SURFACE DRAINAGE
The Rising Water Table in the West Nubarya Area of Egypt,
W75-04363 4B

SURFACE RUNOFF
The Development of a Mathematical Model to Predict Runoff Water Quality from Watersheds,
W75-04551 5B

SURFACE WATERS
Surface Water Quality is Influenced by Agricultural Practices,
W75-04548 5B

SURGE TANKS
Surge Facility for Wet and Dry Weather Flow Control,
W75-04562 5D

SURGES
Flood Plain Information - Cedar Bayou, Houston Metropolitan Area, Texas.
W75-04748 4A

Flood Plain Information--Coastal Flooding, City of Chesapeake, Virginia.
W75-04753 4A

SURVEYS
A systems Analysis of Water Quality Survey Design,
W75-04522 5B

SUSPENDED MATTER
Sphere Method Turbidimeter,
W75-04819 5A

SUSPENDED SOLIDS
Suspended Solids Carried by the Gallatin River of Southwestern Montana: Amounts Carried During Spring Runoff,
W75-04501 2J

SWAMPS
An Ecological Study of a Baldcypress Swamp in St. Charles Parish, Louisiana,
W75-04364 2H

SWEDEN
On the Problem of Vertical Distribution of Precipitation, Especially in Areas with Great Height Differences,
W75-04680 2B

SWEDEN (LAKE MALAREN)
The Effect of Cooling Water Discharges on Zooplankton in a Bay of Lake Malaren,
W75-04496 5C

SWINE
Management of Swine Waste by a Lagoon System,
W75-04632 5D

Test Swine Waste Disposal Systems,
W75-04637 5D

SWINE WASTEWATER
Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

SWISS PREALPS
Factors Affecting the Estimate of Areal Average Summer and Winter Precipitation in a Small Catchment of the Swiss Prealps,
W75-04686 2B

SWITZERLAND (BAYE DE MONTREUX)
Precipitation Measurements by Means of Storage Gauges with Stereo and Horizontal Orifices in the Baye De Montreux Watershed,
W75-04656 7B

SYNOPTIC ANALYSIS
Estimate of Heat Fluxes on the Subjacent Surface (According to Data from Synoptic Analysis),
W75-04737 7C

SYSTEMS ANALYSIS
A systems Analysis of Water Quality Survey Design,
W75-04522 5B

TAIWAN
Precipitation in Taiwan Mountainous Areas,
W75-04675 2B

TAMARISK
Stabilization of Aeolian Lands in Saudi Arabia's Al Hasa Oasis,
W75-04512 3C

TECHNOLOGY
The Role of Water and Land Resources in Alleviating Malnutrition and Hunger in Arid Regions,
W75-04603 6B

TELEVISION INSPECTION
TV Inspections Slash Sewer Costs $300 per Repair,
W75-04830 5G

TEMPERATURE
Temperature Measurements and Internal Waves in Senaca Lake, New York,
W75-04400 2H

Reconstructing the Vertical Profile of Humidity on the Basis of the Vertical Profile of Temperature,
W75-04741 2B

TEMPERATURE AVOIDANCE
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

TERRACING
A Balanced Approach to Resource Extraction and Creative Land Development Associated

with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

TERRITORIAL SEAS (JURISDICTION)
Crisis in the South Pacific: Tunaboat Seizures,
W75-04649 6E

The Blockade 'Exception' To Territorial Water Jurisdiction,
W75-04766 6E

TERRITORIAL WATERS
Crisis in the South Pacific: Tunaboat Seizures,
W75-04649 6E

Jurisdiction in National Waters,
W75-04650 6E

The Marine Environment and Toxic Substances (When was the Last Time You had a Good Swordfish Steak),
W75-04768 6E

TERTIARY TREATMENT
Granular Filters for Tertiary Wastewater Treatment,
W75-04429 5D

Tertiary Treatment: The Wrong Solution to a Non-Problem,
W75-04811 5D

TESTS
Analyzing Biological Properties of Wastes,
W75-04842 5A

TEXAS
The Effects of Mercuric Chloride Upon Respiration in Congeria Leucophaeta,
W75-04472 5C

Special Flood Hazard Information: Cypress Creek, Harris County, Texas.
W75-04742 4A

Special Flood Hazard Information: Clear Creek, Brazoria, Fort Bend, Galveston and Harris Counties, Texas.
W75-04743 4A

Flood Plain Information -- Williamson Creek, Austin, Texas.
W75-04747 4A

Flood Plain Information -- Goose Creek, Baytown, Texas.
W75-04750 4A

Comprehensive Plan for Water, Sewer and Storm Drainage in the Lower Rio Grande Valley, (Volume II).
W75-04759 5D

Nueces River Project, Texas, Part 1.
W75-04786 6E

Authorizing the City of Sherman, Tex., to Construct a Barrier in Denison Dam (Lake Texoma) Red River, Tex. and Okla., for the Purpose of Providing a Municipal and Industrial Water Supply.
W75-04789 6E

Water Quality of Storm Runoff from a Texas Beef Feedlot,
W75-04843 5B

Surface Water Data of the Llano Texas Region, Project Sanguine.
W75-04847 2E

THERMAL CONDUCTIVITY
The Temperature Profiles of Soil Columns During Infiltration,
W75-04389 2G

A Nondestructive Method of Following Moisture Content and Temperature Changes in Soils Using Thermistors,
W75-04605 2G

THERMAL POLLUTION
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

Biologic Detection and Control of Water Pollution,
W75-04447 5C

Abundance, Diversity and Seasonal Patterns of Estuarine Fish Populations,
W75-04485 5C

Influence of Heated Discharge Waters from the 'Skawina' Electric Power Station on the Ichthyofauna of the Rivers Skawinka and Vistula,
W75-04491 5C

The Effect of Cooling Water Discharges on Zooplankton in a Bay of Lake Malaren,
W75-04496 5C

An Experimental Study of the Free Surface Effect on a Buoyant Jet,
W75-04559 8B

THERMAL RADIATION
The Problem of Calculating Cloud Cover in Calculations of Long Wave Radiational Characteristics of the Atmosphere,
W75-04740 2B

THERMOCLINE
Diurnal Temperature Distribution in Small Reservoir,
W75-04443 2H

THUNDERSTORMS
Extreme Thunderstorm Rainfall in the Intermountain Western United States,
W75-04677 2B

TILE EFFLUENTS
The Unreliability of Tile Effluent for Monitoring Subsurface Nitrate-Nitrogen Losses from Soils,
W75-04438 5B

TIME SERIES ANALYSIS
Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

Spectra of Precipitation Series in Mountainous Regions,
W75-04682 7A

The use of the Modified Time Series Analysis Technique for The Determination of Areal Precipitation Accuracies,
W75-04683 2B

TOPOGRAPHY
Characteristics of Precipitation in the Scottish Highlands,
W75-04661 2B

TORNADOES
Tornado or Dust Devel: The Enigma of Desert Whirlwinds,
W75-04372 2B

TORONTO (CANADA)
A Compendium of Information, (The Metropolitan Toronto and Region Conservation Authority).
W75-04760 3D

TOXICITY
Medical Uses of Isotopes,
W75-04417 5C

TRACE ELEMENTS
Trace Metals in Wastewater Effluents,
W75-04806 5B

TRACER TECHNIQUES
Identification and Evaluation of Water Tracers Amenable to Post-Sampling Neutron Activation Analysis,
W75-04355 5A

TRACERS
Identification and Evaluation of Water Tracers Amenable to Post-Sampling Neutron Activation Analysis,
W75-04355 5A

TRACTIVE FORCES
Soil Erosion and Sediment Transport from Gullies,
W75-04707 2J

TRANSFORMATIONS
Mercury in Aquatic Systems: Methylation, Oxidation-Reduction, and Bioaccumulation,
W75-04570 5B

TRANSMUTATION
High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

TRANSMUTATIONS
High-Level Radioactive Waste Management Alternatives.
W75-04402 5D

TRANSPIRATION
Changes in Transpiration, Net Carbon Dioxide Assimilation and Leaf Water Potential Resulting from Application of Hydrostatic Pressure to Roots of Intact Pepper Plants,
W75-04399 3F

Silicon Content of Wheat Husks in Relation to Water Transpired,
W75-04484 2D

Effect of Leaf Area Reduction on the Water Requirement of Barley (Hordeum Vulgare L.),
W75-04511 2I

TRANSPIRATION CONTROL
Effect of Leaf Area Reduction on the Water Requirement of Barley (Hordeum Vulgare L.),
W75-04511 2I

TRANSPORTATION
High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

High-Level Radioactivity Waste Management Alternatives - Section 8: Extraterrestrii Disposal,
W75-04408 5D

A Regional Model of the Future Demand For Transportation: The Case of Barge Transportation,
W75-04520 6A

TRAP EFFICIENCY
Sediment Trap Efficiency of Small Reservoirs,
W75-04702 2J

TREATIES
Crisis in the South Pacific: Tunaboat Seizures,
W75-04649 6E

Jurisdiction in National Waters,
W75-04650 6E

TREATMENT FACILITIES
Computer Control of Chemical Addition at a Water-Treatment Plant,
W75-04535 5F

TREND SURFACE FITTING
Estimating Areal Rainfall by Fitting Surfaces to Irregularly Spaced Data,
W75-04693 7C

TREYNOR (IOWA)
Soil Erosion and Sediment Transport from Gullies,
W75-04707 2J

TRICKLE IRRIGATION
Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04391 2C

Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04507 2G

TRICKLING FILTERS
Trickling Filtration of a Waste Containing NTA,
W75-04427 5D

Apparatus for the Filtration and Biological Purification of Contaminated Water,
W75-04454 5D

TRISODIUM CARBOXYMETHYLOXYSUCCINATE
Biodegradability of a Carboxymethyloxysuccinate Detergent Builder,
W75-04426 5D

TRITIUM
Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

TROPICAL SOILS
The Effect of Soil Texture and Density on the Neutron and Density Probe Calibration for Some Tropical Soils,
W75-04549 2G

TROULOPSIS AUSTROMARINA
Torulopsis Austromarina Sp. Nov. A Yeast Isolated from the Antartic Ocean,
W75-04436 5A

TRUCKEE RIVER (NEV-CALIF)
Numerical Simulation of Unsteady Flow Hydraulics of Truckee River,
W75-04444 6A

TUBE-WELLS
Demand for Irrigation: A Case Study of Government Tube-Wells in Uttar Pradesh,
W75-04529 6D

TURBIDIMETERS
Sphere Method Turbidimeter,
W75-04819 5A

TURBIDITY
Suspended Solids Carried by the Gallatin River of Southwestern Montana: Amounts Carried During Spring Runoff,
W75-04501 2J

Sphere Method Turbidimeter,
W75-04819 5A

TURBIDITY REMOVAL
Turbidity Removal Using Polymers and Activated Carbon,
W75-04820 5F

TURBULENCE
Tornado or Dust Devel: The Enigma of Desert Whirlwinds,
W75-04372 2B

An Experimental Study of the Free Surface Effect on a Buoyant Jet,
W75-04559 8B

A Critical Examination of the Turbulence Instrument used in the Marsta Micro-Meteorological Field Project,
W75-04795 7B

TURF GRASSES
Some Effects of Subirrigation on Bentgrass During Heat Stress in the Field,
W75-04612 2I

ULTRAVIOLET RADIATION
Solubility Studies of Metallic Mercury in Pure Water at Various Temperatures,
W75-04815 5A

UNITED KINGDOM
Orographic Influences on the Distribution of Precipitation,
W75-04676 2B

UNITED KINGDOM (RIVER CHEW)
The Use of Chironomid Pupal Exuviae for Characterizing Streams,
W75-04371 5B

UNITED STATES
ASCE Urban Water Resources Research Program, 1967-1974,
W75-04440 4A

Directory of Environmental Life Scientists,
W75-04468 6G

Jurisdiction of Submerged Lands--Guam, the Virgin Islands and American Samoa.
W75-04783 6E

UNIVERSITIES
Planning, Management and Accountability in Water Resources Research,
W75-04439 6B

Tenth Annual Report, Program Activities, July 1, 1973 - June 30, 1974.
W75-04654 9D

UNOX SYSTEM
Environment, Energy Costs Suggest Oxygen Activated Sludge as Wastewater Treatment Approach,
W75-04827 5D

UNSATURATED FLOW
Simulation of Moisture Transfer in Soils: One-Dimensional Infiltration,
W75-04695 2G

Two-Dimensional Water Infiltration from a Trench in Unsaturated Soils,
W75-04700 2G

UNSATURED FLOW
Unsteady, Unsaturated, N-Dimensional Moisture Flow in Soil: A Computer Simulation Program,
W75-04701 2G

UNSTEADY FLOW
Numerical Simulation of Unsteady Flow Hydraulics of Truckee River,
W75-04444 6A

URBAN HYDROLOGY
A Method for Determining Peak Flows and Detention Storage Requirements in Urbanizing Areas.
W75-04694 4A

URBAN MAPPING
Investigation of Land Use of Northern Megalopolis Using ERTS-1 Imagery,
W75-04726 7C

URBAN RAINFALL
Inadvertent Rain Modification as Indicated by Surface Raincells,
W75-04703 2B

URBAN RUNOFF
The Development of a Mathematical Model to Predict Runoff Water Quality from Watersheds,
W75-04551 5B

A Method for Determining Peak Flows and Detention Storage Requirements in Urbanizing Areas.
W75-04694 4A

URBAN WATER RESOURCES
ASCE Urban Water Resources Research Program, 1967-1974,
W75-04440 4A

URBANIZATION
The Brandywine: Five Years After,
W75-04360 6B

Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

ASCE Urban Water Resources Research Program, 1967-1974,
W75-04440 4A

Correlation of Hydrologic Model Parameters with Changing Land Use as Determined from Aerial Photographs,
W75-04448 4C

A Method for Determining Peak Flows and Detention Storage Requirements in Urbanizing Areas.
W75-04694 4A

USSR
Snow Survey and Methods for Snow Storage Estimation in Mountain River Basins of the Soviet Union,
W75-04659 2C

USSR (VARZOB RIVER BASIN)
Analysis of Snow Cover Distribution from Aerophotography Data Over Experimental Mountain Basin of Varzob River,
W75-04658 7B

USSR (VITIM RIVER BASIN)
Methods for the Study of Laws for the Distribution of Precipitation in Medium-High Mountains (Illustrated by the Vitim River Basin),
W75-04669 2B

UTAH
Economics of Fertilizer Application on Range and Meadow Sites in Utah,
W75-04388 2I

Relation of Orographic Winter Precipitation Patterns to Meteorological Parameters,
W75-04670 2

A Hybrid Computer Simulation Model for Predicting the Effects of the Areal Distribution of Precipitation on Runoff Characteristics,
W75-04692 2B

Planning for Water Quality in the Bear River System in the State of Utah.
W75-04757 5G

VALUE ENGINEERING
Evaluation Problem of Storm Water Routing Mathematical Models,
W75-04708 5D

VARIABILITY
Simple Albedo Feedback Models of the Icecaps,
W75-04794 2C

VEGETATION EFFECTS
Distribution of Different Forms of Nitrogen in Some Desert Soils,
W75-04373 2G

Energy Budget Measurements Over Three Cover Types in Eastern Arizona,
W75-04383 2I

VERMONT
Zahn, ET AL. V. International Paper Co. (Class Action Seeking Damages from Discharges),
W75-04588 6E

VERTICAL DISTRIBUTION
Reconstructing the Vertical Profile of Humidity on the Basis of the Vertical Profile of Temperature,
W75-04741 2B

VIRGIN ISLANDS
Jurisdiction of Submerged Lands--Guam, the Virgin Islands and American Samoa.
W75-04783 6E

VIRGINIA
Flood Plain Information: North Fork Rivanna River, Albemarle County, Virginia.
W75-04745 4A

Flood Plain Information: Mechunk Creek, Albemarle County, Virginia.
W75-04752 4A

Flood Plain Information--Coastal Flooding, City of Chesapeake, Virginia.
W75-04753 4A

VIRUSES
Virological Studies in Water Systems: Natural Occurrence of Reoviruses and Their Inactivation by Physical and Chemical Agents,
W75-04821 5F

WASATCH FRONT RANGE (UTAH)
Relation of Orographic Winter Precipitation Patterns to Meteorological Parameters,
W75-04670 2

WASHINGTON
Effectiveness of Two Nitrification Inhibitors for Anhydrous Ammonia Under Irrigated and Dryland Conditions,
W75-04425 5G

Authorizing the Secretary of the Interior to Construct, Operate, and Maintain the Touchet Division, Walla Walla Project, Oregon-Washington, and for Other Purposes.
W75-04790 6E

WASTE CHARACTERIZATION
Wastewater Characterization for the Specialty Food Industry,
W75-04560 5B

Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

WASTE DILUTION
High-Level Radioactive Waste Management Alternatives.
W75-04402 5D

WASTE DISPOSAL
High-Level Radioactive Waste Management Alternatives.
W75-04402 5D

High-Level Radioactive Waste Management Alternatives - Section 4: Geologic Disposal.
W75-04404 5D

Economic and Environmental Considerations in Dairy Manure Management Systems,
W75-04543 5D

Farms are Not in the Country Any More,
W75-04546 5D

Fertility,
W75-04550 5D

Energy Needed to Manage Animal Waste.
W75-04554 5D

Recycle Organic Wastes as Feed for Meat Animals.
W75-04556 5D

Used Oil Law in the United States and Europe,
W75-04575 5G

Development of an Organic Waste Slurry Injector,
W75-04616 5D

Fast Fluch System,
W75-04622 5D

Dewatering Bovine Animal Manure,
W75-04627 5D

Manure Application Guidelines for the Pacific Northwest,
W75-04631 5G

Manure Handling Systems for the Future,
W75-04635 5D

Test Swine Waste Disposal Systems,
W75-04637 5D

Irrigation for Land Application of Animal Waste,
W75-04638 5D

Will Current Research Answer Today's Problems at the Sanitary Landfill.,
W75-04800 5B

Symposium on Animal Waste Management.
W75-04832 5D

Effects of Cattle Feedlot Manure on Crop Yields and Soil Conditions,
W75-04833 5D

Mechanical Aeration of a Waste Disposal Manure Pit,
W75-04841 5D

WASTE DISPOSAL WELLS
EPA Policy on Injection Wells.
W75-04592 5G

WASTE DUMPS
Will Current Research Answer Today's Problems at the Sanitary Landfill.,
W75-04800 5B

WASTE HANDLING
Nutrient Recovery: New Concept in Waste Handling,
W75-04620 5D

WASTE IDENTIFICATION
Wastewater Characterization for the Specialty Food Industry,
W75-04560 5B

Chemical and Physical Characterization of Tar Samples from the Marine Environment,
W75-04718 5A

WASTE MANAGEMENT
Coprology: A Pollution Solution,
W75-04545 5D

Effect of Ration on Manure Salt Content,
W75-04834 5D

Amounts, Composition, and Management of Feedlot Runoff,
W75-04835 5D

Future Developments in Feedlot Waste Management,
W75-04836 5D

WASTE MIGRATION
Sampling of Variable, Waste-Migration Patterns in Ground Water,
W75-04799 5B

WASTE PARTITIONING
High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

WASTE STORAGE
Retrievable Surface Storage Facility, Alternative Concepts Engineering Studies.
W75-04401 5D

High-Level Radioactive Waste Management Alternatives - Section 4: Geologic Disposal.
W75-04404 5D

High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

Economic and Environmental Considerations in Dairy Manure Management Systems,
W75-04543 5D

Dewatering Bovine Animal Manure,
W75-04627 5D

He Solved His Manure Handling Problem,
W75-04634 5D

Pneumatic Transportation of Manure,
W75-04641 5D

WASTE TREATMENT

High-Level Radioactive Waste Management Alternatives.
W75-04402 5D

High-Level Radioactive Waste Management Alternatives - Section 1-3: Summary, Background and Data Base, and Evaluation Methodology.
W75-04403 5D

High-Level Radioactive Waste Management Alternatives - Section 4: Geologic Disposal.
W75-04404 5D

High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

High-Level Radioactivity Waste Management Alternatives - Section 8: Extraterrestrii Disposal,
W75-04408 5D

High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

Economic and Environmental Considerations in Dairy Manure Management Systems,
W75-04543 5D

Coprology: A Pollution Solution,
W75-04545 5D

Fertility,
W75-04550 5D

Indiana Poultrymen are Composting Poultry Manure,
W75-04552 5D

The Social Redemption of Pure Garbage,
W75-04553 5D

Energy Needed to Manage Animal Waste.
W75-04554 5D

Perpetual-Motion Recycling, or, Pig Manure Into Fish Food,
W75-04555 5D

Control of Pollution from Animal Feedlots and Reuse of Animal Wastes,
W75-04615 5D

New Aerobic Process Turns Waste to Nutrients,
W75-04619 5D

Swine Waste Management Systems,
W75-04629 5D

Effect of Feedlot Laws and Climate on Open Feedlot Waste Management,
W75-04630 5D

Management of Swine Waste by a Lagoon System,
W75-04632 5D

He Solved His Manure Handling Problem,
W75-04634 5D

Manure Handling Systems for the Future,
W75-04635 5D

Tentative Criteria for Design, Construction and Operation of the Batch Type Pasveer Oxidation Ditch System for the Treatment of Animal Wastes,
W75-04636 5D

Pneumatic Transportation of Manure,
W75-04641 5D

In-The-Building Oxidation Ditches for Livestock Wastes,
W75-04643 5D

Settling Basin Design for Raceway Fish Production Systems,
W75-04646 5D

Laboratory Studies on Feedlot Runoff,
W75-04653 5D

Mechanical Aeration of a Waste Disposal Manure Pit,
W75-04841 5D

WASTE WATER DISPOSAL

Water Pollution--Liquid Wastes (As Amended).
W75-04777 5G

WASTE WATER (POLLUTION)

E.P.A. Policy to Protect the Nation's Wetlands.
W75-04593 5G

Ammonia Desorption by Diffused Aeration,
W75-04812 5D

WASTE WATER TREATMENT

Biodegradability of a Carboxymethyloxysuccinate Detergent Builder,
W75-04426 5D

Trickling Filtration of a Waste Containing NTA,
W75-04427 5D

Fluidized-Bed Sludge Incinerator Design,
W75-04428 5D

Granular Filters for Tertiary Wastewater Treatment,
W75-04429 5D

1971 Annual Review of Literature. Waste Water Treatment Physical and Chemical Methods,
W75-04437 5D

Electrochemical Process for Nutrient Removal,
W75-04446 5D

Apparatus for the Filtration and Biological Purification of Contaminated Water,
W75-04454 5D

Sewage Treatment System,
W75-04456 5D

Water Clarification with Nitrogen-Heterocyclic Phosphonic Acids,
W75-04457 5D

Recovery of Potable Water From Sanitary Waste Using Solid Wastes and Refuse as a Heat Source,
W75-04458 5D

Vertical, Multistage-Flash, Falling Film Column for Distilling Brine,
W75-04459 3A

Self-Reconditioning Filter Apparatus for Continuous Removal of Solids From a Stream of Liquid,
W75-04460 5D

Method for Treatment of Coal Washery Waters,
W75-04463 5D

Method for Electrosanitizing Waste Water,
W75-04464 5D

Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

Notes--Workshop on Computer-Aided Design and Simulation of Waste Treatment Systems,
W75-04518 5D

A Prototype System to Renovate and Recycle Swine Wastes Hydraulically,
W75-04542 5D

Coprology: A Pollution Solution,
W75-04545 5D

Simulation and Statistical Quality Control for Water Pollution Abatement,
W75-04557 5G

Microbiological Production of Geosmin,
W75-04561 5D

Dry Caustic Peeling of Clingstone Peaches on a Commercial Scale,
W75-04564 5D

Separation, Dewatering and Disposal of Sugarbeet Transport Water Solids, (Phase I),
W75-04565 5D

An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

E.P.A. Policy to Protect the Nation's Wetlands.
W75-04593 5G

Development of an Organic Waste Slurry Injector,
W75-04616 5D

Nutrient Recovery: New Concept in Waste Handling,
W75-04620 5D

Fast Fluch System,
W75-04622 5D

Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

Methods of Removing Nitrates From Water,
W75-04626 5D

Dewatering Bovine Animal Manure,
W75-04627 5D

Laboratory Study of Continuous Electrooxidation of Dilute Cyanide Wastes,
W75-04719 5D

Trace Metals in Wastewater Effluents,
W75-04806 5B

Special Methods Open Storm-Blocked Pipeline.
W75-04808 8C

Precoat Filtration on Rotary Vacuum Filter (Precoat-Filtration Auf Dem Vakuum-Trommelfilter),
W75-04810 5D

Tertiary Treatment: The Wrong Solution to a Non-Problem,
W75-04811 5D

Ammonia Desorption by Diffused Aeration,
W75-04812 5D

Bubble Size and Contact Time in Diffused Aeration Systems,
W75-04813 5D

Wastewater analysis and its Relation to Company Profits,
W75-04817 5A

Applicability of Control Strategies to the Activated Sludge Wastewater Treatment Process,
W75-04822 5D

Sewage Treatment in the Potteries,
W75-04823 5D

Activated Sludge Bulking (In Japanese),
W75-04824 5D

Coagulation-Filtration Practice as Related to Research.
W75-04825 5D

Solid Adsorbents for Gas and Liquid Treatment,
W75-04826 5D

Environment, Energy Costs Suggest Oxygen Activated Sludge as Wastewater Treatment Approach,
W75-04827 5D

More Than a Myriad.
W75-04829 5D

Kinetics in Ozone Treatment of Secondary Sewage Effluents, (In Japanese),
W75-04831 5D

Symposium on Animal Waste Management.
W75-04832 5D

WASTES

High-Level Radioactive Waste Management Alternatives - Section 1-3: Summary, Background and Data Base, and Evaluation Methodology.
W75-04403 5D

An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

WATER ALLOCATION (POLICY)

Water: Canadian Needs and Resources,
W75-04359 6B

Authorizing the Secretary of the Interior to Construct, Operate, and Maintain the Touchet Division, Walla Walla Project, Oregon-Washington, and for Other Purposes.
W75-04790 6E

WATER ANALYSIS

Instrumentation Improves Water Treatment Plant Operation,
W75-04434 5F

Measurement of Hydrocarbons in Water: Application to Cases of Surface Water Pollution,
W75-04709 5A

WATER AVAILABILITY

Pattern of Water Availability and Water Requirement for Grain Sorghum Production at Samaru, Nigeria,
W75-04384 3F

WATER BALANCE

Deficiencies in Measured Snow Precipitation in a Mountainous Area in Norway,
W75-04684 2C

WATER CLARIFICATION

Water Clarification with Nitrogen-Heterocyclic Phosphonic Acids,
W75-04457 5D

WATER CONSERVATION

The Brandywine: Five Years After,
W75-04360 6B

More Water for Arid Lands, Promising Technologies and Research Opportunities.
W75-04508 3B

A Compendium of Information, (The Metropolitan Toronto and Region Conservation Authority).
W75-04760 3D

Procedural Methods for Implementing Colorado River Water Conservation Measures.
W75-04778 6E

WATER CONVEYANCE

The Design and Promotion of a Scheme Using Mixed Water from the Rivers Ancholme, Witham and Trent for Industrial Supply to Humberside,
W75-04764 3E

WATER COOLING

Union of Concerned Scientists V. Atomic Energy Comm'n. (Review of Orders of AEC Licensing Nuclear Powerplant).
W75-04775 6E

WATER DELIVERY

Water-Distribution Research and Applied Development Needs.
W75-04763 6B

WATER DEMAND

Water: Canadian Needs and Resources,
W75-04359 6B

Demand for Irrigation: A Case Study of Government Tube-Wells in Uttar Pradesh,
W75-04529 6D

Application of the Main II Water Forecasting System to Wyoming Communities,
W75-04541 6D

Water Recycle/Reuse Possibilities: Power Plant Boiler and Cooling Systems,
W75-04566 5D

The Design and Promotion of a Scheme Using Mixed Water from the Rivers Ancholme, Witham and Trent for Industrial Supply to Humberside,
W75-04764 3E

WATER DEMANDS

An Operational Framework for Coastal Zone Management Planning.
W75-04558 6A

WATER DISTRIBUTION

The Effect of Initial Moisture Content and Infiltration Quantity of Redistribution of Soil Water,
W75-04517 2G

WATER DISTRIBUTION (APPLIED)

Winch-Driven Irrigation Apparatus,
W75-04452 3F

Design and Application of a Multipurpose Management Information System for Drinking Water Quality Assessment in Distribution Systems,
W75-04505 5G

The Design of a Livestock Water Distribution System--Large Scale,
W75-04527 3F

Amending the Act of July 4, 1955, as Amended, Relating to the Construction of Irrigation Distribution Systems.
W75-04597 6E

Water-Distribution Research and Applied Development Needs.
W75-04763 6B

WATER DROPS

The Coalescence of Water Drops,
W75-04728 1A

WATER HARDNESS

Remarks on Bionomy of Family Cyprinodontidae (Pisces) with Respect to Dependency of Development of Embryos of Roloffia Foloffi (Ahl., 1938) on the Hardness of the Water, (In German),
W75-04494 2I

WATER HARVESTING

More Water for Arid Lands, Promising Technologies and Research Opportunities.
W75-04508 3B

WATER HYACINTH

Aquatic Plant Control Program, State of Florida (Final Environmental Impact Statement).
W75-04598 5G

WATER IMPORTING

The Design and Promotion of a Scheme Using Mixed Water from the Rivers Ancholme, Witham and Trent for Industrial Supply to Humberside,
W75-04764 3E

WATER LAW

Water: Canadian Needs and Resources,
W75-04359 6B

Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

WATER LEVEL FLUCTUATIONS

Regulation of Great Lakes Water Levels--Appendix E--Commercial Navigation.
W75-04601 2H

WATER LOSS

Susceptibility of Grain Sorghum to Water Deficit at Three Growth Stages,
W75-04483 3F

WATER MANAGEMENT (APPLIED)

Water: Canadian Needs and Resources,
W75-04359 6B

The Brandywine: Five Years After,
W75-04360 6B

Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

Effects of Agricultural Acreage Reduction on Water Availability and Salinity in the Upper Colorado River Basin,
W75-04368 6B

ASCE Urban Water Resources Research Program, 1967-1974,
W75-04440 4A

Design and Application of a Multipurpose Management Information System for Drinking Water Quality Assessment in Distribution Systems,
W75-04505 5G

Optimal Operation of Multiple Reservoir System,
W75-04532 4A

Drainage for Agriculture,
W75-04537 3F

Water Management Systems,
W75-04538 3F

Environmental Land and Water Management Act--Amendments,
W75-04581 5G

The Design and Promotion of a Scheme Using Mixed Water from the Rivers Ancholme, Witham and Trent for Industrial Supply to Humberside,
W75-04764 3E

WATER PERMITS

Complying with Discharge Regulations,
W75-04431 5G

WATER POLICY

Effects of Agricultural Acreage Reduction on Water Availability and Salinity in the Upper Colorado River Basin,
W75-04368 6B

E.P.A. Policy to Protect the Nation's Wetlands.
W75-04593 5G

Flood Disaster Protection Act of 1973.
W75-04600 6F

WATER POLLUTION

Nitrogen Release Associated with the Decrease in Soil Organic Matter in Newly Cultivated Soils,
W75-04367 5B

The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

Retrievable Surface Storage Facility, Alternative Concepts Engineering Studies.
W75-04401 5D

Control of Pollution from Animal Feedlots and Reuse of Animal Wastes,
W75-04615 5D

Chemical and Physical Characterization of Tar Samples from the Marine Environment,
W75-04718 5A

Are we Ready for a Closed System of Water Supply, Treatment, and Reuse - Technology vs. Psychology,
W75-04761 5D

The Marine Environment and Toxic Substances (When was the Last Time You had a Good Swordfish Steak),
W75-04768 6E

Subsurface Sewage Disposal and Contamination of Ground Water in East Portland, Oregon,
W75-04798 5B

Sampling of Variable, Waste-Migration Patterns in Ground Water,
W75-04799 5B

Water Quality by Photographic Analysis,
W75-04814 5A

Wastewater analysis and its Relation to Company Profits,
W75-04817 5A

Sewage Treatment in the Potteries,
W75-04823 5D

WATER POLLUTION CONTROL

Water: Canadian Needs and Resources,
W75-04359 6B

Complying with Discharge Regulations,
W75-04431 5G

Methods for Elimination of Oil Slicks,
W75-04455 5G

Design, Construction and Launching of a Submarine Outfall Sewer at Whitstable,
W75-04536 5D

Economic and Environmental Considerations in Dairy Manure Management Systems,
W75-04543 5D

An In-Depth Look at Federal Pollution Controls,
W75-04544 5G

An Evaluation of Marketable Effluent Permit Systems,
W75-04571 5G

Used Oil Law in the United States and Europe,
W75-04575 5G

EPA Preparing to 'Railroad' Through New Pollution Rules Covering Cattle Feedlots,
W75-04639 5G

An Examination of Alternative Methods for Employing Booms to Contain Oil Spills in Navy Harbors,
W75-04720 5G

Planning for Water Quality in the Bear River System in the State of Utah.
W75-04757 5G

WATER POLLUTION EFFECTS

The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

The Effects of Mercuric Chloride Upon Respiration in Congeria Leucophaeta,
W75-04472 5C

Benthic Community Respiration Near the Woods Hole Sewage Outfall,
W75-04503 5C

Environmental Requirements and Pollution Tolerance of Freshwater Diatoms,
W75-04563 5C

The Effects of the Interaction of Outboard Motors with the Aquatic Environment: A Review,
W75-04816 5C

Effects of Pollution on Freshwater Fish, (Literature Review),
W75-04848 5C

WATER POLLUTION SOURCES

Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

Fluoride Concentrations in Two Pacific Coast Inlets-An Indication of Industrial Contamination,
W75-04473 5B

Chemicals and Allied Products, (Literature Review),
W75-04474 5G

Reducing Feedlot Nitrates in Your Ground Water,
W75-04547 5B

Surface Water Quality is Influenced by Agricultural Practices,
W75-04548 5B

Dry Caustic Peeling of Clingstone Peaches on a Commercial Scale,
W75-04564 5D

Organic Compounds Entering Ground Water from a Landfill,
W75-04573 5B

Nonpoint Agricultural Pollution: Status of Assessment Methodology,
W75-04645 5B

The Disposal of Radioactive Wastes Into the Sea: Some International Legal Considerations.
W75-04769 6E

Amelioration of Effects of Oil Spills.
W75-04779 5G

Sampling of Variable, Waste-Migration Patterns in Ground Water,
W75-04799 5B

Sources of Metals in New York City Wastewater,
W75-04805 5B

WATER POTENTIAL

Salt and Water Movement in Relatively Dry Soil,
W75-04516 2G

WATER PURIFICATION

Closed-Loop Ozone Generating and Contacting System,
W75-04461 5D

Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

A Bill to Assure Safe Drinking Water.
W75-04652 6E

WATER QUALITY

Environmental Values and Water Quality Planning,
W75-04530 5G

WATER QUALITY

Drainage for Agriculture,
W75-04537 3F

Surface Water Quality is Influenced by Agricultural Practices,
W75-04548 5B

The Development of a Mathematical Model to Predict Runoff Water Quality from Watersheds,
W75-04551 5B

Water Quality Management Basin Plans Regulations Adopted,
W75-04584 5G

Water Quality Standards: The Federal Perspective--Progress Toward Objectives,
W75-04595 5G

Optimal Weighting Function in Water Quality Modeling,
W75-04614 5B

Planning for Water Quality in the Bear River System in the State of Utah.
W75-04757 5G

Water Quality by Photographic Analysis,
W75-04814 5A

The Relationship Between Animal Wastes and Water Quality.
W75-04840 5G

Water Quality of Storm Runoff from a Texas Beef Feedlot,
W75-04843 5B

WATER QUALITY ACT

Water Quality Standards: The Federal Perspective--Progress Toward Objectives,
W75-04595 5G

WATER QUALITY CONTROL

Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

Methods for Elimination of Oil Slicks,
W75-04455 5G

Design and Application of a Multipurpose Management Information System for Drinking Water Quality Assessment in Distribution Systems,
W75-04505 5G

A systems Analysis of Water Quality Survey Design,
W75-04522 5B

An Economic Analysis of Agricultural Land Use Practices to Control Water Quality,
W75-04526 5G

Computer Control of Chemical Addition at a Water-Treatment Plant,
W75-04535 5F

Simulation and Statistical Quality Control for Water Pollution Abatement,
W75-04557 5G

Water Quality Standards: The Federal Perspective--Progress Toward Objectives,
W75-04595 5G

Water Quality Control--The Role of the Interstate Agency,
W75-04596 5G

Controls on the Quality Variations of Some Carbonate Spring Waters,
W75-04710 2F

Routine Surveillance Alternatives for Water Quality Management,
W75-04803 5A

WATER QUALITY MANAGEMENT

Sewage Treatment in the Potteries,
W75-04823 5D

WATER QUALITY STANDARDS

Water Quality Standards: The Federal Perspective--Progress Toward Objectives,
W75-04595 5G

WATER-REPELLENCY

Mechanism of Fire-Induced Water Repellency in Soil,
W75-04515 2G

WATER REQUIREMENTS

Pattern of Water Availability and Water Requirement for Grain Sorghum Production at Samaru, Nigeria,
W75-04384 3F

Effect of Leaf Area Reduction on the Water Requirement of Barley (Hordeum Vulgare L.),
W75-04511 2I

Application of the Main II Water Forecasting System to Wyoming Communities,
W75-04541 6D

WATER RESOURCES

An Analysis of Forest Water Problems in Georgia,
W75-04356 4D

African Attitudes Toward the Law of the Sea,
W75-04771 6E

WATER RESOURCES DEVELOPMENT

Water: Canadian Needs and Resources,
W75-04359 6B

Differences Between Planned and Actual Costs and Benefits in Small Watershed Development,
W75-04433 4D

Environmental Land and Water Management Act--Amendments,
W75-04581 5G

EPA to Issue Impact Statements on Some Regulatory Actions,
W75-04586 5G

The Role of Water and Land Resources in Alleviating Malnutrition and Hunger in Arid Regions,
W75-04603 6B

Water Rights and Assessments, (Proposals Involving Antarctic Icebergs for the Colorado River Basin, California, Mexico and Other Arid Lands),
W75-04610 3B

Comprehensive Plan for Water, Sewer and Storm Drainage in the Lower Rio Grande Valley, (Volume II).
W75-04759 5D

African Attitudes Toward the Law of the Sea,
W75-04771 6E

Nueces River Project, Texas, Part 1.
W75-04786 6E

Authorizing the Secretary of the Interior to Construct, Operate, and Maintain the East Greenacres Unit, Rathdrum Prairie Project, Idaho, and for Other Purposes.
W75-04787 6E

Economics, (Literature Review),
W75-04846 5G

WATER RESOURCES INSTITUTE

Tenth Annual Report, Program Activities, July 1, 1973 - June 30, 1974.
W75-04654 9D

WATER RESOURCES RESEARCH ACT

Tenth Annual Report, Program Activities, July 1, 1973 - June 30, 1974.
W75-04654 9D

WATER REUSE

Nitrogen Mass Balance Determination for Simulated Wastewater Land-Spreading Operations,
W75-04449 5D

A Prototype System to Renovate and Recycle Swine Wastes Hydraulically,
W75-04542 5D

Coprology: A Pollution Solution,
W75-04545 5D

Water Recycle/Reuse Possibilities: Power Plant Boiler and Cooling Systems,
W75-04566 5D

Development of an Organic Waste Slurry Injector,
W75-04616 5D

Irrigation for Land Application of Animal Waste,
W75-04638 5D

WATER RIGHTS

Effects of Agricultural Acreage Reduction on Water Availability and Salinity in the Upper Colorado River Basin,
W75-04368 6B

WATER RIGHTS (NON-RIPARIANS)

Incorporated Village of Cornwall V. Environmental Protection Administration of the City of New York (Village Seeking Annulment of Withdrawal of Conditional Approval for Interconnection with Aqueduct from Upstate Watershed and Issuance of Final Approval of Application).
W75-04781 6E

WATER SAMPLING

Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

A systems Analysis of Water Quality Survey Design,
W75-04522 5B

WATER SOURCES

Study of Subsurface Flow Into Mountain Streams as Related to Topography and Partial (Variable) Source Areas,
W75-04357 4D

The Varying Source Area of Streamflow from Upland Basins,
W75-04358 4D

Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

WATER STORAGE
Living City, (Melbourne, Australia, Review of Operations, 1972-73).
W75-04762 3D

Authorizing the City of Sherman, Tex., to Construct a Barrier in Denison Dam (Lake Texoma) Red River, Tex. and Okla., for the Purpose of Providing a Municipal and Industrial Water Supply.
W75-04789 6E

WATER SUPPLY
Groundwater Pumpage in Northern Illinois, 1960-1970,
W75-04727 4B

Living City, (Melbourne, Australia, Review of Operations, 1972-73).
W75-04762 3D

The Design and Promotion of a Scheme Using Mixed Water from the Rivers Ancholme, Witham and Trent for Industrial Supply to Humberside,
W75-04764 3E

Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

Incorporated Village of Cornwall V. Environmental Protection Administration of the City of New York (Village Seeking Annulment of Withdrawal of Conditional Approval for Interconnection with Aqueduct from Upstate Watershed and Issuance of Final Approval of Application).
W75-04781 6E

Authorizing the Secretary of the Interior to Construct, Operate, and Maintain the East Greenacres Unit, Rathdrum Prairie Project, Idaho, and for Other Purposes.
W75-04787 6E

Authorizing the City of Sherman, Tex., to Construct a Barrier in Denison Dam (Lake Texoma) Red River, Tex. and Okla., for the Purpose of Providing a Municipal and Industrial Water Supply.
W75-04789 6E

Sources of Metals in New York City Wastewater,
W75-04805 5B

Asbestiform Amphibole Minerals: Detection and Measurement of High Concentrations in Municipal Water Supplies,
W75-04818 5A

WATER SUPPLY DEVELOPMENT
Water Rights and Assessments, (Proposals Involving Antarctic Icebergs for the Colorado River Basin, California, Mexico and Other Arid Lands),
W75-04610 3B

Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

WATER TABLE
The Rising Water Table in the West Nubarya Area of Egypt,
W75-04363 4B

WATER TEMPERATURE
Diurnal Temperature Distribution in Small Reservoir,
W75-04443 2H

Temperature Dynamics in Dimictic Lakes,
W75-04705 2H

WATER TREATMENT
Computer Control of Chemical Addition at a Water-Treatment Plant,
W75-04535 5F

Turbidity Removal Using Polymers and Activated Carbon,
W75-04820 5F

Virological Studies in Water Systems: Natural Occurrence of Reoviruses and Their Inactivation by Physical and Chemical Agents,
W75-04821 5F

Coagulation-Filtration Practice as Related to Research.
W75-04825 5D

WATER UTILIZATION
Model for Predicting Plant Yield as Influenced by Water Use,
W75-04609 2I

WATER YIELD
Water Yield as an Index of Lee and Windward Topographic Effects on Precipitation,
W75-04678 2B

WATER YIELD IMPROVEMENT
Control of Gambel Oak with Three Herbicides,
W75-04366 3B

Wood Boring Insect Infestations in Relation to Mesquite Control Practices,
W75-04380 3B

WATERCOURSES
Inflatable Barriers for Watercourses,
W75-04467 8A

WATERSHED MANAGEMENT
Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

Infiltration for Three Rangeland Soil-Vegetation Complexes,
W75-04377 2G

Differences Between Planned and Actual Costs and Benefits in Small Watershed Development,
W75-04433 4D

Water Quality Management Basin Plans Regulations Adopted,
W75-04584 5G

Water Quality Control--The Role of the Interstate Agency,
W75-04596 5G

WATERSHEDS (BASINS)
The Brandywine: Five Years After,
W75-04360 6B

The Distribution of Precipitation in Some Mountainous Canadian Watersheds,
W75-04671 2B

Factors Affecting the Estimate of Areal Average Summer and Winter Precipitation in a Small Catchment of the Swiss Prealps,
W75-04686 2B

WAVE ACTION
Floating Wave Barrier,
W75-04453 8A

WAVE ENERGY
Floating Wave Barrier,
W75-04453 8A

WAVES (WATER)
Temperature Measurements and Internal Waves in Senaca Lake, New York,
W75-04400 2H

Floating Wave Barrier,
W75-04453 8A

WEATHER
Precipitation in Taiwan Mountainous Areas,
W75-04675 2B

WEATHER MODIFICATION
Inadvertent Rain Modification as Indicated by Surface Raincells,
W75-04703 2B

Atmospheric Water Resources Management Program - Bridger Range Cloud Seeding Experiment,
W75-04721 3B

WEATHER PATTERNS
Inadvertent Rain Modification as Indicated by Surface Raincells,
W75-04703 2B

WEATHERING
Micromorphology. A Discipline at the Chemistry-Minerology Interface,
W75-04608 2G

WEIGHTING FUNCTION
Optimal Weighting Function in Water Quality Modeling,
W75-04614 5B

WEIGHTING FUNCTIONS (ANALYSIS)
The Objective Analysis of Relative Humidity,
W75-04791 2B

WELL PERMITS
EPA Policy on Injection Wells.
W75-04592 5G

WETLANDS
Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

E.P.A. Policy to Protect the Nation's Wetlands.
W75-04593 5G

Authorization for Secretary of Interior to Acquire Additional Wetlands.
W75-04651 6E

WHEAT
Silicon Content of Wheat Husks in Relation to Water Transpired,
W75-04484 2D

Comparison of Banded and Broadcast Fertilizer Applications in Relation to Compaction and Irrigation in Maize and Wheat,
W75-04611 3F

WHEAT YIELD
Effect of Qualities of Irrigation Water and Fertilizers on Soil Properties, Yield and Nutrient Uptake by Wheat,
W75-04482 3F

WHITE PERCH
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

WILLIAMSON CREEK (TEX)
Flood Plain Information -- Williamson Creek, Austin, Texas.
W75-04747 4A

WIND VELOCITY
Tornado or Dust Devel: The Enigma of Desert Whirlwinds,
W75-04372 2B

WINDBREAKS
Stabilization of Aeolian Lands in Saudi Arabia's Al Hasa Oasis,
W75-04512 3C

WINDS
Computation of Air Flow Over Mountains in Statically Stable Situations,
W75-04663 2B

About Vertical Gradients of Liquid Precipitation in Mountains,
W75-04668 2B

WINNIPEG (MANITOBA)
Hydraulic Analysis of Winnipeg Sump Inlets,
W75-04804 5D

WISCONSIN
He Solved His Manure Handling Problem,
W75-04634 5D

Flood Plain Information: Report on the Des Plaines River, Illinois and Wisconsin.
W75-04746 4A

WOOD BORING INSECTS
Wood Boring Insect Infestations in Relation to Mesquite Control Practices,
W75-04380 3B

WYOMING
Some Effects of Spring Snowmelt Runoff on Aquatic Invertebrate Populations in a High Moutain Stream,
W75-04450 2I

Application of the Main II Water Forecasting System to Wyoming Communities,
W75-04541 6D

YEASTS
Torulopsis Austromarina Sp. Nov. A Yeast Isolated from the Antartic Ocean,
W75-04436 5A

YOLO LIGHT CLAY
Simulation of Moisture Transfer in Soils: One-Dimensional Infiltration,
W75-04695 2G

YUGOSLAVIA
The Characteristic Changes of the Amount of Precipitation in Connection with Altitude in the Mountainous Areas of Yugoslavia,
W75-04673 2B

YUGOSLAVIA (GORSKI KOTAR AND LIKA)
Maximum Daily Precipitation in Gorski Kotar and Lika (Yugoslavia) in Relation to the Overflying Air-Stream,
W75-04666 2B

YUGOSLAVIA (LIKA-GORSKI KOTAR)
A Possibility of Airflow - Precipitation Regime Investigations,
W75-04660 2B

ZERO DISCHARGE
An In-Depth Look at Federal Pollution Controls,
W75-04544 5G

EPA Preparing to 'Railroad' Through New Pollution Rules Covering Cattle Feedlots,
W75-04639 5G

ZOOGLOEA SP.
Bacterial Zoogloea Formation,
W75-04572 5D

ZOOPLANKTON
The Effect of Cooling Water Discharges on Zooplankton in a Bay of Lake Malaren,
W75-04496 5C

Acid-Iron Waste as a Factor Affecting the Distribution and Abundance of Zooplankton in the New York Bight: II. Spatial Variations in the Field and Implications for Monitoring Studies,
W75-04574 5B

AUTHOR INDEX

AARSTAD, J. S.
Calculation of the Drainage Component of Soil Water Depletion,
W75-04374 2G

ABALJAN, T. S.
Analysis of Snow Cover Distribution from Aerophotography Data Over Experimental Mountain Basin of Varzob River,
W75-04658 7B

ABBOTT, G. T.
A Survey of Federal and Mississippi Environmental Law with an Examination of its effect on Land Development,
W75-04845 6G

ABEL, J. W.
Crisis in the South Pacific: Tunaboat Seizures,
W75-04649 6E

ABRAHAM, C. E.
Computer Use for River Regulation,
W75-04531 4A

ADAM, K. M.
Hydraulic Analysis of Winnipeg Sump Inlets,
W75-04804 5D

ADAMS, C. E.
Determination of the Molecular Solubility of Navy Oils in Water,
W75-04722 5A

ADAMS, J. E.
A Method for Measuring First-Stage Soil Water Evaporation in the Field,
W75-04698 2D

AGEE, J. L.
Water Quality Standards: The Federal Perspective--Progress Toward Objectives,
W75-04595 5G

AIKEN, C. L. V.
A Geophysical and Geological Investigation of Potentially Favorable Areas for Petroleum Exploration in Southeastern Arizona,
W75-04509 2J

AKIYAMA, T.
Frequent Occurrence of Heavy Rainfall Along the North Side to the Low-Level Jet Stream in the Baiu Season,
W75-04704 2B

AL-ADSANI, A. M. S.
The World's Largest Desalting Complex--A Report on Twenty Years Experience,
W75-04422 3A

AL-KHAFAF, S.
Evaluation of the Filter Paper Method for Estimating Soil Water Potential,
W75-04506 2G

ALAM, F. C. K.
Distribution of Precipitation in Mountainous Areas of West Pakistan,
W75-04674 2B

ALETI, A.
Nonpoint Agricultural Pollution: Status of Assessment Methodology,
W75-04645 5B

ALFARO, J. F.
Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04391 2C

Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04507 2G

ALLISON, L.
Jurisdiction in National Waters,
W75-04650 6E

ALLISON, L. E.
Oversaturation Method for Preparing Saturation Extracts for Salinity Appraisal,
W75-04392 2G

AMIARD-TRIQUET, C.
The Effect of Salinity and Ionic Equilibrium on Contamination of Arenicola Marina L. (Annelida: Polychaeta) by Cesium-137, (In French),
W75-04489 5C

ANDERSON, H. W.
Water Yield as an Index of Lee and Windward Topographic Effects on Precipitation,
W75-04678 2B

ANDRE, P. D.
Nutrient Recovery: New Concept in Waste Handling,
W75-04620 5D

Slats in the Southwest,
W75-04621 5D

ANDREWS, D. J.
Pattern of Water Availability and Water Requirement for Grain Sorghum Production at Samaru, Nigeria,
W75-04384 3F

ANDREWS, J. F.
A systems Analysis of Water Quality Survey Design,
W75-04522 5B

ANIOL, R.
Rainfall at the Hohenpeissenberg and the Weather Situation,
W75-04662 2B

ARCHULETA, R. F.
Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

ARKIN, G. F.
A Method for Measuring First-Stage Soil Water Evaporation in the Field,
W75-04698 2D

ARMALY, F.
Diurnal Temperature Distribution in Small Reservoir,
W75-04443 2H

ARMAN, J. A.
Development of Guidelines for the Design of Subsurface Drainage Systems for Highway Pavement Structural Sections,
W75-04809 8A

ASPIN, M.
Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

ATKINS, M. J.
The Objective Analysis of Relative Humidity,
W75-04791 2B

ATTMANNSPACHER, W.
Area Precipitation Measurement with X-Band Radar from a Mountain North of the Alps,
W75-04691 7B

AVNIMELECH, Y.
Nitrogen Release Associated with the Decrease in Soil Organic Matter in Newly Cultivated Soils,
W75-04367 5B

BARCKHAUSEN, R.
Vertical, Multistage-Flash, Falling Film Column for Distilling Brine,
W75-04459 3A

BALDING, F. R.
The Influence of Soil Water Potential on the Perennial Vegetation of a Desert Arroyo,
W75-04365 2I

BANKS, P. A.
Sewage Treatment in the Potteries,
W75-04823 5D

BARFIELD, B. J.
The Unreliability of Tile Effluent for Monitoring Subsurface Nitrate-Nitrogen Losses from Soils,
W75-04438 5B

BARGER, W. R.
Determination of the Thickness of Petroleum Films on Water,
W75-04723 5A

BARTLETT, H. D.
Dewatering Bovine Animal Manure,
W75-04627 5D

BARTLETT, J. W.
High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

BASAK, P.
Stress-Strain Response for Sand,
W75-04696 8D

BASSETT, C. R.
Dissolved and Particulate Humic Acid in an East Coast Estuary,
W75-04504 5B

BAUMANN, E. R.
Granular Filters for Tertiary Wastewater Treatment,
W75-04429 5D

BAZLOVA, T. I.
Reconstructing the Vertical Profile of Humidity on the Basis of the Vertical Profile of Temperature,
W75-04741 2B

BEATLEY, J. C.
Phenological Events and Their Environmental Triggers in Mojave Desert Ecosystems,
W75-04385 2I

BEAUCHAMP, E. G.
A Leak-Proof Sampling Port in Gas Analyses Studies,
W75-04697 7B

BECK, L. A.
Methods of Removing Nitrates From Water,
W75-04626 5D

BELL, D. T.
Dominance of California Annual Grasslands by Brassica Nigra,
W75-04435 2I

BENECKE, P.
Unsteady, Unsaturated, N-Dimensional Moisture Flow in Soil: A Computer Simulation Program,
W75-04701 2G

BENEDICT, J.
The Brandywine: Five Years After,
W75-04360 6B

BENOIT, D. A.
Effects of Pollution on Freshwater Fish, (Literature Review),
W75-04848 5C

BENSON, C. R.
Groundwater Pumpage in Northern Illinois, 1960-1970,
W75-04727 4B

BERNDT, H.
Precoat Filtration on Rotary Vacuum Filter (Precoat-Filtration Auf Dem Vakuum-Trommelfilter),
W75-04810 5D

BERRY, J. G.
Indiana Poultrymen are Composting Poultry Manure,
W75-04552 5D

BERTHOUEX, P. M.
Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

BEWTRA, J. K.
Bubble Size and Contact Time in Diffused Aeration Systems,
W75-04813 5D

BIENIARZ, K.
Influence of Heated Discharge Waters from the 'Skawina' Electric Power Station on the Ichthyofauna of the Rivers Skawinka and Vistula,
W75-04491 5C

BIGGAR, J. W.
The Combined Effects of Infiltration and Redistribution on Leaching,
W75-04606 2G

BLAIR, B. J.
Effects of Cattle Feedlot Manure on Crop Yields and Soil Conditions,
W75-04833 5D

BLANCHARD, B. J.
A Balanced Approach to Resource Extraction and Creative Land Development Associated with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

BLEAK, A. T.
Range Plant Yield and Species Relationships in Natural and Partially Controlled Environments,
W75-04378 2I

BLEASDALE, A.
Orographic Influences on the Distribution of Precipitation,
W75-04676 2B

BLUMBERG, D. F.
A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

BOLTON, R. E.
An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

BORISENKOV, YE. P.
Automated System for Measurement, Collection and Processing of Hydrometeorological Data Aboard Scientific Research Vessels of the Gugms (Sigma-S),
W75-04730 7C

A Small-Parameter Model of Circulation in an Homogeneous Baroclinic Ocean,
W75-04738 2L

Small Parametric Model of the Precomputation of Meteorological Fields on the Basis of Complete Equations and Its Energetic Analogs,
W75-04736 7C

BOS, R. E.
Dewatering Bovine Animal Manure,
W75-04627 5D

BOUMA, J.
Uniform Distribution in Soil Absorption Fields,
W75-04807 5D

BOWLEY, W. W.
Floating Wave Barrier,
W75-04453 8A

BOWYER, F. J.
The Design and Promotion of a Scheme Using Mixed Water from the Rivers Ancholme, Witham and Trent for Industrial Supply to Humberside,
W75-04764 3E

BOYUM, A.
Salsvatn, A Lake with Old Sea Water,
W75-04500 2H

BRABY, L. A.
Nuclear Techniques in Medical Science,
W75-04412 5A

Radiation Dosimetry,
W75-04414 5C

BRADFORD, B. H.
Control Strategy Development Study, San Francisco Wastewater Master Plan,
W75-04352 5D

BRADFORD, J. M.
Soil Erosion and Sediment Transport from Gullies,
W75-04707 2J

BRADY, L. A.
Radiation Biophysics,
W75-04415 5C

BRAHMA, S. P.
Stress-Strain Response for Sand,
W75-04696 8D

BRANDSON, N. B.
Hydraulic Analysis of Winnipeg Sump Inlets,
W75-04804 5D

BRAUD, H. J.
Raindrop Characteristics in South Central United States,
W75-04713 2B

BRAY, L. A.
High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

BREVIK, T. J.
He Solved His Manure Handling Problem,
W75-04634 5D

BREWER, R.
Micromorphology. A Discipline at the Chemistry-Minerology Interface,
W75-04608 2G

BRIDGE, B. J.
A Nondestructive Method of Following Moisture Content and Temperature Changes in Soils Using Thermistors,
W75-04605 2G

BRIGHT, P. L.
The Use of Chironomid Pupal Exuviae for Characterizing Streams,
W75-04371 5B

BRINKMANN, W. L. F.
Relative Rates of Flow of the Negro and Solimoes Rivers (Determined) Through O18 Concentrations, (In Porteguese),
W75-04495 2E

BRODZINSKI, R. L.
Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

BROWN, C. L.
High-Level Radioactivity Waste Management Alternatives - Section 8: Extraterrestrii Disposal,
W75-04408 5D

BROWN, H. D.
A New Technique for the Study of Epiphytic Algae,
W75-04499 5C

BROWN, R. H.
Fast Fluch System,
W75-04622 5D

BROWNELL, L. E.
Lysimeter Experiment Description and Progress Report on Neutron Measurements,
W75-04725 2D

BROWNING, V. D.
Effect of Root Pruning on Water Relations and Growth of Cotton,
W75-04613 2I

BUDDEMEIER, R. W.
Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

BULJAN, M.
Contact (Oil) Water Determination in Terrestrial-Waters Using an Oceanographic Method,
W75-04502 5A

BUNNELL, L. R.
Medical Uses of Isotopes,
W75-04417 5C

BURAS, N.
Water Management Systems,
W75-04538 3F

BURD, R. S.
Water Quality Standards: The Federal Perspective--Progress Toward Objectives,
W75-04595 5G

BURGER, L. L.
High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

BURKHEAD, C. E.
Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

BURNHAM, J. B.
High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

BURNS, R. E.
High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

BUTCHBAKER, A. F.
Effect of Feedlot Laws and Climate on Open Feedlot Waste Management,
W75-04630 5D

BUTLER, B. J.
Micrometeorological Measurements for Pesticide Drift Studies,
W75-04714 5B

BYERLEY, J. J.
Laboratory Study of Continuous Electrooxidation of Dilute Cyanide Wastes,
W75-04719 5D

CAMPBELL, C. J.
Management of Phreatophyte and Riparian Vegetation for Maximum Multiple Use Values,
W75-04379 3B

CAMPBELL, C. P.
Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

CAPPENBERG, T.
Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. I. Field Observations,
W75-04469 5C

Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. II. Inhibition Experiments,
W75-04470 5C

CARMICHAEL, R. D.
Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

CARROLL, R. J.
Manual for Deicing Chemicals: Application Practices,
W75-04567 5G

Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

CARRUTH, P. JR.
African Attitudes Toward the Law of the Sea,
W75-04771 6E

CARTER, C. E.
Raindrop Characteristics in South Central United States,
W75-04713 2B

CASLER, G. L.
Economic and Environmental Considerations in Dairy Manure Management Systems,
W75-04543 5D

CEDERGREN, H. R.
Development of Guidelines for the Design of Subsurface Drainage Systems for Highway Pavement Structural Sections,
W75-04809 8A

CEHAK, K.
Statistical Considerations About Snow Conditions in the Austrian Alps,
W75-04667 2C

CHAN, Y. K.
Orographic Influences on the Distribution of Precipitation,
W75-04676 2B

CHAPMAN, S. W. JR.
Nitrogen Mass Balance Determination for Simulated Wastewater Land-Spreading Operations,
W75-04449 5D

CHAUDHARY, M. R.
Comparison of Banded and Broadcast Fertilizer Applications in Relation to Compaction and Irrigation in Maize and Wheat,
W75-04611 3F

CHEN, A.
Use of Leaf Resistance for Predicting Irrigation Scheduling,
W75-04351 3F

CHEN, K. Y.
Trace Metals in Wastewater Effluents,
W75-04806 5B

CHERRY, D. S.
Biologic Detection and Control of Water Pollution,
W75-04447 5C

CHERUBINI, A.
An Ecological Study of a Baldcypress Swamp in St. Charles Parish, Louisiana,
W75-04364 2H

CHESNESS, J. L.
Settling Basin Design for Raceway Fish Production Systems,
W75-04646 5D

CHILDS, K. E.
Sampling of Variable, Waste-Migration Patterns in Ground Water,
W75-04799 5B

CHIPLEY, A. S.
Will Current Research Answer Today's Problems at the Sanitary Landfill.,
W75-04800 5B

CHIU, S. Y.
Nonpoint Agricultural Pollution: Status of Assessment Methodology,
W75-04645 5B

CHOI, E. S-H.
Solution of Simultaneous Partial Differential Equations: An Extension of PDEL,
W75-04539 6A

CHRISTENSEN, G. M.
Effects of Pollution on Freshwater Fish, (Literature Review),
W75-04848 5C

CHRISTENSEN, L. R.
Laboratory Studies on Feedlot Runoff,
W75-04653 5D

CLARK, J.
Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

CLARK, K. N.
A Balanced Approach to Resource Extraction and Creative Land Development Associated with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

CLARK, R. N.
Amounts, Composition, and Management of Feedlot Runoff,
W75-04835 5D

CLARY, W. P.
Response of Herbaceous Vegetation to Felling of Alligator Juniper,
W75-04376 2I

CLEASBY, J. L.
Trickling Filtration of a Waste Containing NTA,
W75-04427 5D

CLEMENT, T. M. JR.
Engineering a Victory for the Environment: A Citizen's Guide to the U.S. Army Corps of Engineers,
W75-04755 6G

CLEMENTS III, E. V.
Wastewater Characterization for the Specialty Food Industry,
W75-04560 5B

COCHRAN, V. L.
Effectiveness of Two Nitrification Inhibitors for Anhydrous Ammonia Under Irrigated and Dryland Conditions,
W75-04425 5G

COHEN, J. M.
1971 Annual Review of Literature. Waste Water Treatment Physical and Chemical Methods,
W75-04437 5D

COLE, C. V.
Study of Orographic Effect on Optimum Number of Raingauges,
W75-04681 7A

COLLIS-GEORGE, N.
The Temperature Profiles of Soil Columns During Infiltration,
W75-04389 2G

COMER, G. H.
Spectra of Precipitation Series in Mountainous Regions,
W75-04682 7A

CONNELL, J. R.
An Assessment of Warm Fog - Nucleation, Control, and Recommended Research,
W75-04717 2B

COOK, P. M.
Asbestiform Amphibole Minerals: Detection and Measurement of High Concentrations in Municipal Water Supplies,
W75-04818 5A

COOLEY, A. M.
Separation, Dewatering and Disposal of Sugarbeet Transport Water Solids, (Phase I),
W75-04565 5D

CORNISH, P. M.
A Nondestructive Method of Following Moisture Content and Temperature Changes in Soils Using Thermistors,
W75-04605 2G

CORRIN, M. L.
An Assessment of Warm Fog - Nucleation, Control, and Recommended Research,
W75-04717 2B

COURTRIGHT, B.
Winch-Driven Irrigation Apparatus,
W75-04452 3F

COX, M. F.
Mercury in Aquatic Systems: Methylation, Oxidation-Reduction, and Bioaccumulation,
W75-04570 5B

CRAM, J. S.
Water: Canadian Needs and Resources,
W75-04359 6B

CREER, J. M.
Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

CROSS, F. T.
Recipient Radiation Exposure - Circulatory Support Systems,
W75-04419 5C

CUNGE, J. A.
Evaluation Problem of Storm Water Routing Mathematical Models,
W75-04708 5D

CUNNINGHAM, G. L.
The Influence of Soil Water Potential on the Perennial Vegetation of a Desert Arroyo,
W75-04365 2I

DALE, A. C.
Tentative Criteria for Design, Construction and Operation of the Batch Type Pasveer Oxidation Ditch System for the Treatment of Animal Wastes,
W75-04636 5D

DAUGHERTY, R. V.
Enterobacteria in Feedlot Waste and Runoff,
W75-04633 5A

DAVIS, P. A.
Precipitation Estimates from Meteorological Satellite Data,
W75-04685 2B

DAY, D. L.
In-The-Building Oxidation Ditches for Livestock Wastes,
W75-04643 5D

DE CASABIANCA, M-L.
Influence of Freshwater Dulution on Dynamics of Populations of Builder Crustaceans from Lagoon of Biguglia, Corsica (Corophium Insidiosum C., Tanais Cavolinii M.E., Erichthonius Brasiliensis D.), (In French),
W75-04490 2H

DE RIDDER, N. A.
The Rising Water Table in the West Nubarya Area of Egypt,
W75-04363 4B

DECKER, J. R.
Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

DEES, P.
A Brief Historical Survey of Freedom of the Seas,
W75-04648 6E

DELIJANIC, I.
The Characteristic Changes of the Amount of Precipitation in Connection with Altitude in the Mountainous Areas of Yugoslavia,
W75-04673 2B

DELUCIA, R. J.
An Evaluation of Marketable Effluent Permit Systems,
W75-04571 5G

DENDY, F. E.
Sediment Trap Efficiency of Small Reservoirs,
W75-04702 2J

DESSOUKY, M. I.
A Two-Dimensional Multi-Stage Programming Model: With Application to Reservoir Systems,
W75-04523 4A

DHAWAN, B. D.
Demand for Irrigation: A Case Study of Government Tube-Wells in Uttar Pradesh,
W75-04529 6D

DIVINE, J. R.
High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

DIXON, A. L. JR.
Methods for Elimination of Oil Slicks,
W75-04455 5G

DOBRENZ, A. K.
Effect of Leaf Area Reduction on the Water Requirement of Barley (Hordeum Vulgare L.),
W75-04511 2I

DONOVAN, T. J.
The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

DORN, P.
The Effects of Mercuric Chloride Upon Respiration in Congeria Leucophaeta,
W75-04472 5C

DOSS, B. D.
Irrigation, Row width, and Plant Population in Relation to Growth Characteristics of Two Soybean Varieties,
W75-04369 3F

DOWNING, P. B.
Enforcement Economics in Air Pollution Control,
W75-04569 5G

DRUMHELLER, K.
High-Level Radioactivity Waste Management Alternatives - Section 8: Extraterrestrii Disposal,
W75-04408 5D

DUDLEY, J. G.
Nutrient Enrichment of Groundwater from Septic Tank Disposal Systems,
W75-04758 5C

DURU, J. O.
Synthesis of Hydrograph Recessions Adjusted for Evapotranspiration Losses,
W75-04712 2E

DYUBKIN, I. A.
The Problem of Organization of a Coastal Coordinating Computer Center,
W75-04732 7C

Software for the Sigma-S,
W75-04731 7C

A System of Automated Processing of Deep Water Hydrological Information,
W75-04733 7C

DZURISIN, G. L.
Groundwater Pumpage in Northern Illinois, 1960-1970,
W75-04727 4B

EDA, M.
Kinetics in Ozone Treatment of Secondary Sewage Effluents, (In Japanese),
W75-04831 5D

EDWARDS, K. A.
Estimating Areal Rainfall by Fitting Surfaces to Irregularly Spaced Data,
W75-04693 7C

EDWARDS, R. R. C.
Production Ecology of Two Caribbean Marine Ecosystems: II. Metabolism and Energy Flow,
W75-04480 5C

Production Ecology of Two Caribean Marine Ecosystems: I. Physical Environment and Fauna,
W75-04479 5C

EFTINK, B.
Manure Handling Systems for the Future,
W75-04635 5D

EL-RAMLY, N.
Geothermal Wells in Imperial Valley, California: Desalting Potentials, Historical Development, and A Selected Bibliography,
W75-04423 3A

ELIASSEN, A.
Computation of Air Flow Over Mountains in Statically Stable Situations,
W75-04663 2B

ELLIS, B.
Sampling of Variable, Waste-Migration Patterns in Ground Water,
W75-04799 5B

ELLIS, L. V.
Mechanical Aeration of a Waste Disposal Manure Pit,
W75-04841 5D

ENNS, K.
Laboratory Study of Continuous Electrooxidation of Dilute Cyanide Wastes,
W75-04719 5D

EPLER, P.
Influence of Heated Discharge Waters from the 'Skawina' Electric Power Station on the Ichthyofauna of the Rivers Skawinka and Vistula,
W75-04491 5C

FAIRBANK, W. C.
Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

FARMER, E. E.
Some Intra-Storm Characteristics of High-Intensity Rainfall Bursts,
W75-04689 2B

FARQUHAR, J.
Wastewater Characterization for the Specialty Food Industry,
W75-04560 5B

FARRAH, S. R.
Bacterial Zoogloea Formation,
W75-04572 5D

FARRINGTON, J. W.
Petroleum Hydrocarbons in Narragansett Bay: I. Survey of Hydrocarbons in Sediments and Clams (Mercenaria Mercenaria),
W75-04477 5B

FEDOROV, O. M.
Automated System for Measurement, Collection and Processing of Hydrometeorological Data Aboard Scientific Research Vessels of the Gugms (Sigma-S),
W75-04730 7C

FELL, J.
Torulopsis Austromarina Sp. Nov. A Yeast Isolated from the Antartic Ocean,
W75-04436 5A

FEREBEE, R. N.
Biologic Detection and Control of Water Pollution,
W75-04447 5C

FERGUSON, H. L.
The Distribution of Precipitation in Some Mountainous Canadian Watersheds,
W75-04671 2B

FLEMING, B.
Tailor Made Confinement Barn,
W75-04617 5D

FLETCHER, J. E.
Some Intra-Storm Characteristics of High-Intensity Rainfall Bursts,
W75-04689 2B

FLIEGEL, M. H.
Temperature Measurements and Internal Waves in Senaca Lake, New York,
W75-04400 2H

FLOYD, J. M.
Raindrop Characteristics in South Central United States,
W75-04713 2B

FORD, D. E.
Temperature Dynamics in Dimictic Lakes,
W75-04705 2H

FORDYCE, I. V.
Separation, Dewatering and Disposal of Sugarbeet Transport Water Solids, (Phase I),
W75-04565 5D

FOUTZ, A. L.
Effect of Leaf Area Reduction on the Water Requirement of Barley (Hordeum Vulgare L.),
W75-04511 2I

FRANK, S.
Remarks on Bionomy of Family Cyprinodontidae (Pisces) with Respect to Dependency of Development of Embryos of Roloffia Foloffi (Ahl., 1938) on the Hardness of the Water, (In German),
W75-04494 2I

FRANZ, M.
Perpetual-Motion Recycling, or, Pig Manure Into Fish Food,
W75-04555 5D

FREEMAN, G. E.
Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

FRIEDMAN, I.
Relative Rates of Flow of the Negro and Solimoes Rivers (Determined) Through O18 Concentrations, (In Porteguese),
W75-04495 2E

FUKS, Z. R.
The Problem of the Influence of Ocean Currents on Free Internal Gravity Waves,
W75-04739 2L

FULLERTON, C. M.
Some Characteristics of Hawaiian High-Intensity Rainfall,
W75-04442 2B

GALAKHOV, Z. P.
The Problem of Calculating Cloud Cover in Calculations of Long Wave Radiational Characteristics of the Atmosphere,
W75-04740 2B

GANZINOTTI, J. V.
Inflatable Barriers for Watercourses,
W75-04467 8A

GARRETT, P.
Fascicle Density and Needle Growth Responses of Red Pine to Water Supply Over Two Seasons,
W75-04424 2I

GARRETT, W. D.
Determination of the Thickness of Petroleum Films on Water,
W75-04723 5A

GARTON, J. E.
Effect of Feedlot Laws and Climate on Open Feedlot Waste Management,
W75-04630 5D

GEE, G. W.
Changes in Transpiration, Net Carbon Dioxide Assimilation and Leaf Water Potential Resulting from Application of Hydrostatic Pressure to Roots of Intact Pepper Plants,
W75-04399 3F

GEORGE, R. M.
Mechanical Aeration of a Waste Disposal Manure Pit,
W75-04841 5D

GERAKIS, P. A.
Environmental Consequences of Land Use in Arid and Semiarid Areas,
W75-04514 6G

GERBER, N. N.
Microbiological Production of Geosmin,
W75-04561 5D

GERO, A. J.
An Assessment of Warm Fog - Nucleation, Control, and Recommended Research,
W75-04717 2B

GIBSON, C. I.
Abundance, Diversity and Seasonal Patterns of Estuarine Fish Populations,
W75-04485 5C

GIFT, J. J.
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

GIGON, A.
Comparative Photosynthetic Capacities of Intertidal Algae Under Exposed and Submerged Conditions,
W75-04524 5C

GILBERTSON, C. B.
Pierced Steel Planking Surfacing for Feedlot Runoff Control,
W75-04644 5D

GILCHRIST, R. W.
A systems Analysis of Water Quality Survey Design,
W75-04522 5B

GILLILAND, B. E.
A systems Analysis of Water Quality Survey Design,
W75-04522 5B

GILLIS, M. F.
Medical Uses of Isotopes,
W75-04417 5C

Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

GJORSVIK, O. G.
Deficiencies in Measured Snow Precipitation in a Mountainous Area in Norway,
W75-04684 2C

GLASS, G. E.
Asbestiform Amphibole Minerals: Detection and Measurement of High Concentrations in Municipal Water Supplies,
W75-04818 5A

GODA, T.
Kinetics in Ozone Treatment of Secondary Sewage Effluents, (In Japanese),
W75-04831 5D

GOERING, C. E.
Micrometeorological Measurements for Pesticide Drift Studies,
W75-04714 5B

GOLD, R. C.
Development of an Organic Waste Slurry Injector,
W75-04616 5D

GOLDSTEIN, W.
Investigation of Land Use of Northern Megalopolis Using ERTS-1 Imagery,
W75-04726 7C

GOLUEKE, C. G.
Changing from Dumping to Recycling. Part 2. Organic Wastes,
W75-04642 5D

GOOD, W. R.
Some Effects of Spring Snowmelt Runoff on Aquatic Invertebrate Populations in a High Moutain Stream,
W75-04450 2I

GORDON, N. R.
Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

GORE, B. F.
High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

GOTTBRATH, J.
Swine Waste Management Systems,
W75-04629 5D

GRABSKE, R. J.
Method for the Construction of Three-Dimensional Electron Micrographs,
W75-04394 5A

GRANSTROM, M. L.
Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

GRAU, C. R.
Sewage-Grown Algae as a Feedstuff for Chicks,
W75-04618 5D

GRAVES, R. E.
An In-Depth Look at Federal Pollution Controls,
W75-04544 5G

GREEN, F. H. W.
Characteristics of Precipitation in the Scottish Highlands,
W75-04661 2B

GREEN, R. L.
Synthesis of Hydrograph Recessions Adjusted for Evapotranspiration Losses,
W75-04712 2E

GREER, J. D.
Raindrop Characteristics in South Central United States,
W75-04713 2B

GRICE, G. D.
Acid-Iron Waste as a Factor Affecting the Distribution and Abundance of Zooplankton in the New York Bight: II. Spatial Variations in the Field and Implications for Monitoring Studies,
W75-04574 5B

GRIGGS, B.
High-Level Radioactivity Waste Management Alternatives - Section 8: Extraterrestrii Disposal,
W75-04408 5D

GULMON, S. L.
Comparative Photosynthetic Capacities of Intertidal Algae Under Exposed and Submerged Conditions,
W75-04524 5C

GUPTA, V. L.
Numerical Simulation of Unsteady Flow Hydraulics of Truckee River,
W75-04444 6A

GUTHRIE, R. K.
Biologic Detection and Control of Water Pollution,
W75-04447 5C

HADAS, A.
Water Uptake by Seeds as Affected by Water Stress, Capillary Conductivity, and Seed-Soil Water Contact. I. Experimental Study and, II. Analysis of Experimental Data,
W75-04381 2I

HAFETZ, L.
An Experimental Study of the Free Surface Effect on a Buoyant Jet,
W75-04559 8B

HAFEZ, A. A. R.
Comparative Changes in Soil-Physical Properties Induced by Admixtures of Manures from Various Domestic Animals,
W75-04602 2G

HAGIHARA, T.
Self-Reconditioning Filter Apparatus for Continuous Removal of Solids From a Stream of Liquid,
W75-04460 5D

HAIR, M. E.
Dissolved and Particulate Humic Acid in an East Coast Estuary,
W75-04504 5B

HAKALA, T.
Vertical Distribution of Freshwater Mussels (Pelecypoda, Unionidae) in Southwestern Finland,
W75-04486 2I

HAMM, D.
A Study of the Waste Wash Water from Egg Washing Machines,
W75-04475 5B

HANKS, R. J.
Evaluation of the Filter Paper Method for Estimating Soil Water Potential,
W75-04506 2G

Model for Predicting Plant Yield as Influenced by Water Use,
W75-04609 2I

Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04391 2C

Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04507 2G

HANN, J. A.
A Balanced Approach to Resource Extraction and Creative Land Development Associated with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

HANSEN, E. M.
Extreme Thunderstorm Rainfall in the Intermountain Western United States,
W75-04677 2B

HARBO, R.
Fluoride Concentrations in Two Pacific Coast Inlets-An Indication of Industrial Contamination,
W75-04473 5B

HARDISTY, D. M.
Rational Basis for Septic Tank System Design,
W75-04801 5D

HARDY, B. E.
Design, Construction and Launching of a Submarine Outfall Sewer at Whitstable,
W75-04536 5D

HARGROVE, T.
Test Swine Waste Disposal Systems,
W75-04637 5D

HARPSTEAD, M. I.
The Classification of Some Nigerian Soils,
W75-04390 2G

HART, V. L.
Spy Mesa Yields Better Understanding of Pinyon-Juniper in Range Ecosystem,
W75-04375 2I

HARTE, J.
On the Vulnerability of Ecosystems Disturbed by Man,
W75-04521 5C

HAUG, R. M.
Distribution of Different Forms of Nitrogen in Some Desert Soils,
W75-04373 2G

HAUKIOJA, E.
Vertical Distribution of Freshwater Mussels (Pelecypoda, Unionidae) in Southwestern Finland,
W75-04486 2I

HAUPT, H. F.
Improved Instrumentation for Measuring Melted Precipitation on Windswept Topography,
W75-04655 7B

HAWKINS, H. S.
The Design and Promotion of a Scheme Using Mixed Water from the Rivers Ancholme, Witham and Trent for Industrial Supply to Humberside,
W75-04764 3E

HEALY, K. A.
Rational Basis for Septic Tank System Design,
W75-04801 5D

HEDENLAND, L. D.
Tertiary Treatment: The Wrong Solution to a Non-Problem,
W75-04811 5D

HEIMAN, M. K.
An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

HEIMBACH, J. A.
Atmospheric Water Resources Management Program - Bridger Range Cloud Seeding Experiment,
W75-04721 3B

HELD, I. M.
Simple Albedo Feedback Models of the Icecaps,
W75-04794 2C

HELLSTROM, D. I.
Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

HERMANSON, R. E.
Management of Swine Waste by a Lagoon System,
W75-04632 5D

HERSHFIELD, D. M.
Spectra of Precipitation Series in Mountainous Regions,
W75-04682 7A

HEWLETT, J. D.
An Analysis of Forest Water Problems in Georgia,
W75-04356 4D

Study of Subsurface Flow Into Mountain Streams as Related to Topography and Partial (Variable) Source Areas,
W75-04357 4D

The Varying Source Area of Streamflow from Upland Basins,
W75-04358 4D

HILER, E. A.
Susceptibility of Grain Sorghum to Water Deficit at Three Growth Stages,
W75-04483 3F

HILL, T. K.
Settling Basin Design for Raceway Fish Production Systems,
W75-04646 5D

HILLSBERG, J.
Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

HINMAN, W. C.
Effects of Fertilizer and Available Moisture on the Yield and N and P Content of Wheat and on Soil Nutrients,
W75-04628 3F

HINN, G. M.
Nuclear Techniques in Medical Science,
W75-04412 5A

HIRSCH, A.
Water Quality Standards: The Federal Perspective--Progress Toward Objectives,
W75-04595 5G

HOAGLAND, E.
Acid-Iron Waste as a Factor Affecting the Distribution and Abundance of Zooplankton in the New York Bight: II. Spatial Variations in the Field and Implications for Monitoring Studies,
W75-04574 5B

HOGSTROM, U.
A Critical Examination of the Turbulence Instrument used in the Marsta Micro-Meteorological Field Project,
W75-04795 7B

HOLM, H. W.
Mercury in Aquatic Systems: Methylation, Oxidation-Reduction, and Bioaccumulation,
W75-04570 5B

HOLMES, E. T.
A Survey of Federal and Mississippi Environmental Law with an Examination of its effect on Land Development,
W75-04845 6G

HOLT, R. F.
Surface Water Quality is Influenced by Agricultural Practices,
W75-04548 5B

HOLTAN, H. N.
Synthesis of Hydrograph Recessions Adjusted for Evapotranspiration Losses,
W75-04712 2E

HORSFIELD, B.
Swine Waste Management Systems,
W75-04629 5D

HORSFIELD, B. C.
Irrigation for Land Application of Animal Waste,
W75-04638 5D

HORTON, J. S.
Management of Phreatophyte and Riparian Vegetation for Maximum Multiple Use Values,
W75-04379 3B

HOWE, C. W.
Effects of Agricultural Acreage Reduction on Water Availability and Salinity in the Upper Colorado River Basin,
W75-04368 6B

HRUBANT, G. R.
Enterobacteria in Feedlot Waste and Runoff,
W75-04633 5A

HSIEH, J. J. C.
Lysimeter Experiment Description and Progress Report on Neutron Measurements,
W75-04725 2D

HSIEH, Y. P.
Suspended Solids Carried by the Gallatin River of Southwestern Montana: Amounts Carried During Spring Runoff,
W75-04501 2J

HUANG, C.-Y.
Nitrogen Fixation (Acetylene Reduction) by Phytoplankton in Green Bay, Lake Michigan, in Relation to Nutrient Concentrations,
W75-04498 5C

HUANG, J. C.
Are we Ready for a Closed System of Water Supply, Treatment, and Reuse - Technology vs. Psychology,
W75-04761 5D

HUANG, J. Y. C.
Granular Filters for Tertiary Wastewater Treatment,
W75-04429 5D

HUBLY, D. W.
Trickling Filtration of a Waste Containing NTA,
W75-04427 5D

HUFEN, T. H.
Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

HULL, A. C. JR.
Range Plant Yield and Species Relationships in Natural and Partially Controlled Environments,
W75-04378 2I

HULT, J. L.
Water Rights and Assessments, (Proposals Involving Antarctic Icebergs for the Colorado River Basin, California, Mexico and Other Arid Lands),
W75-04610 3B

HUNGATE, F. P.
Medical Uses of Isotopes,
W75-04417 5C

HUNTER, I.
Torulopsis Austromarina Sp. Nov. A Yeast Isolated from the Antartic Ocean,
W75-04436 5A

HUNTER, W. G.
Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

HUTCHINSON, P.
The use of the Modified Time Series Analysis Technique for The Determination of Areal Precipitation Accuracies,
W75-04683 2B

HUTTON, J. T.
Silicon Content of Wheat Husks in Relation to Water Transpired,
W75-04484 2D

HYLAND, R. E.
High-Level Radioactivity Waste Management Alternatives - Section 8: Extraterrestrii Disposal,
W75-04408 5D

IDSO, S. B.
Tornado or Dust Devel: The Enigma of Desert Whirlwinds,
W75-04372 2B

ILLIAN, J. R.
Subsurface Sewage Disposal and Contamination of Ground Water in East Portland, Oregon,
W75-04798 5B

IRWIN, W. A.
Economic Disincentives for Pollution Control: Legal, Political, and Administrative Disincentives,
W75-04576 5G

Used Oil Law in the United States and Europe,
W75-04575 5G

ISRAELSEN, E. K.
A Hybrid Computer Simulation Model for Predicting the Effects of the Areal Distribution of Precipitation on Runoff Characteristics,
W75-04692 2B

JACKIVICZ, T. P. JR.
The Effects of the Interaction of Outboard Motors with the Aquatic Environment: A Review,
W75-04816 5C

JACOBS, J. J.
An Economic Analysis of Agricultural Land Use Practices to Control Water Quality,
W75-04526 5G

Economic and Environmental Considerations in Dairy Manure Management Systems,
W75-04543 5D

JACOBSON, R. L.
Controls on the Quality Variations of Some Carbonate Spring Waters,
W75-04710 2F

JAMES, L. D.
Economics, (Literature Review),
W75-04846 5G

JAN, T. K.
Trace Metals in Wastewater Effluents,
W75-04806 5B

JANES, B. E.
Changes in Transpiration, Net Carbon Dioxide Assimilation and Leaf Water Potential Resulting from Application of Hydrostatic Pressure to Roots of Intact Pepper Plants,
W75-04399 3F

JEGLUM, J. K.
Relative Influence of Moisture-Aeration and Nutrients on Vegetation and Black Spruce Growth in Northern Ontario,
W75-04837 2I

JENKINS, D.
Biodegradability of a Carboxymethyloxysuccinate Detergent Builder,
W75-04426 5D

JESTER, W. A.
Identification and Evaluation of Water Tracers Amenable to Post-Sampling Neutron Activation Analysis,
W75-04355 5A

JIUSTO, J. E.
Diurnal Variations in Cloud Condensation Nuclei,
W75-04711 2B

JOHNSON, G. V.
Some Effects of Subirrigation on Bentgrass During Heat Stress in the Field,
W75-04612 2I

JOHNSON, O. S.
Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

JOHNSON, R. G.
Particulate Matter at the Sediment-Water Interface in Coastal Environments,
W75-04497 2L

JOHNSON, W. S.
Comparative Photosynthetic Capacities of Intertidal Algae Under Exposed and Submerged Conditions,
W75-04524 5C

JOHNSTON, H. S.
Supersonic Aircraft and the Ozone Layer,
W75-04393 5A

JOHNSTON, R.
Environmental Values and Water Quality Planning,
W75-04530 5G

JOINER, T. J.
Planning, Management and Accountability in Water Resources Research,
W75-04439 6B

JONES, C. J.
Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

JORDAN, R. L.
Methods for Elimination of Oil Slicks,
W75-04455 5G

JORDAN, W. R.
Susceptibility of Grain Sorghum to Water Deficit at Three Growth Stages,
W75-04483 3F

JORQUE, M.
Organic Compounds Entering Ground Water from a Landfill,
W75-04573 5B

KADLEC, J.
Swine Waste Management Systems,
W75-04629 5D

KAWAHARA, O.
Kinetics in Ozone Treatment of Secondary Sewage Effluents, (In Japanese),
W75-04831 5D

KEENE, J. C.
Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

KELLER, H. M.
Factors Affecting the Estimate of Areal Average Summer and Winter Precipitation in a Small Catchment of the Swiss Prealps,
W75-04686 2B

KELLER, J.
Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04391 2C

Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04507 2G

KELLER, W.
Range Plant Yield and Species Relationships in Natural and Partially Controlled Environments,
W75-04378 2I

KEM, J. A.
Wastewater analysis and its Relation to Company Profits,
W75-04817 5A

KENNAUGH, J. H.
Flood Hazard Reports: Tools for Resource Planning and Management,
W75-04432 4A

KHALIL, M. B.
River Regime With Special Reference to River Nile,
W75-04706 2E

KHARSHAN, A. A.
Snow Survey and Methods for Snow Storage Estimation in Mountain River Basins of the Soviet Union,
W75-04659 2C

KHATAVKAR, G. D.
Study of Orographic Effect on Optimum Number of Raingauges,
W75-04681 7A

KIRDA, C.
The Combined Effects of Infiltration and Redistribution on Leaching,
W75-04606 2G

KIRSCHNER, S. L.
Sources of Metals in New York City Wastewater,
W75-04805 5B

KLAGES, M. G.
Suspended Solids Carried by the Gallatin River of Southwestern Montana: Amounts Carried During Spring Runoff,
W75-04501 2J

KLASS, D. L.
Hydrate Forming in Water Desalination,
W75-04466 3A

KLEIN, L. A.
Sources of Metals in New York City Wastewater,
W75-04805 5B

KLEIN, N. W.
Sewage-Grown Algae as a Feedstuff for Chicks,
W75-04618 5D

KLEIN, S. A.
Biodegradability of a Carboxymethyloxysuccinate Detergent Builder,
W75-04426 5D

KLEPPER, B.
Effect of Root Pruning on Water Relations and Growth of Cotton,
W75-04613 2I

KLETT, R. H.
Effect of Ration on Manure Salt Content,
W75-04834 5D

KLOOSTER, S. A.
Water Quality by Photographic Analysis,
W75-04814 5A

KLYUKBIN, L. N.
A System of Automated Processing of Deep Water Hydrological Information,
W75-04733 7C

KNOX, R. A.
Rotating Hydraulics of Strait and Sill Flows,
W75-04716 2L

KOMAROV, V. D.
Snow Survey and Methods for Snow Storage Estimation in Mountain River Basins of the Soviet Union,
W75-04659 2C

KOON, J. L.
Management of Swine Waste by a Lagoon System,
W75-04632 5D

KOSOROK, J. R.
Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

KOVACS, S.
Design and Application of a Multipurpose Management Information System for Drinking Water Quality Assessment in Distribution Systems,
W75-04505 5G

KOWAL, J.
Pattern of Water Availability and Water Requirement for Grain Sorghum Production at Samaru, Nigeria,
W75-04384 3F

KRANS, J. V.
Some Effects of Subirrigation on Bentgrass During Heat Stress in the Field,
W75-04612 2I

KUGELMAN, I. J.
1971 Annual Review of Literature. Waste Water Treatment Physical and Chemical Methods,
W75-04437 5D

KUHNER, J.
An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

KULKARNI, G. A.
Study of Orographic Effect on Optimum Number of Raingauges,
W75-04681 7A

KULKARNI, K. M.
Adoption of Network Techniques in the Planning and Execution of Irrigation and Power Projects,
W75-04533 3F

KULPERGER, R. J.
Environment, Energy Costs Suggest Oxygen Activated Sludge as Wastewater Treatment Approach,
W75-04827 5D

KURIHARA, T.
Studies on the Effectiveness of the Guppy Poecilia Reticulata in Controlling Culex Pipiens S.L.:I. Laboratory Experiments on Predation Behavior, (In Japanese),
W75-04382 5G

KUZMINSKI, L. N.
The Effects of the Interaction of Outboard Motors with the Aquatic Environment: A Review,
W75-04816 5C

KYNARD, B. E.
Freshwater Jellyfish (Craspedacusta Sowerbyi) in Lake Patagonia, Southern Arizona,
W75-04386 8I

KYUSHIN, S.
Activated Sludge Bulking (In Japanese),
W75-04824 5D

LAAK, R.
Rational Basis for Septic Tank System Design,
W75-04801 5D

LADD, T. A.
Trickling Filtration of a Waste Containing NTA,
W75-04427 5D

LAI, M. G.
Determination of the Molecular Solubility of Navy Oils in Water,
W75-04722 5A

LAILAS, N.
Complying with Discharge Regulations,
W75-04431 5G

LAL, P.
Effect of Qualities of Irrigation Water and Fertilizers on Soil Properties, Yield and Nutrient Uptake by Wheat,
W75-04482 3F

LAL, R.
The Effect of Soil Texture and Density on the Neutron and Density Probe Calibration for Some Tropical Soils,
W75-04549 2G

The Temperature Profiles of Soil Columns During Infiltration,
W75-04389 2G

LAM, C. M.
Parameter Identification in Distributed Systems Using a Digital Simulation Language: An Extension of PDEL,
W75-04540 6A

LANG, M.
Sources of Metals in New York City Wastewater,
W75-04805 5B

LANGMUIR, D.
Controls on the Quality Variations of Some Carbonate Spring Waters,
W75-04710 2F

LANNER, M.
The Effect of Cooling Water Discharges on Zooplankton in a Bay of Lake Malaren,
W75-04496 5C

LARSON, J. J.
An Examination of Alternative Methods for Employing Booms to Contain Oil Spills in Navy Harbors,
W75-04720 5G

LARSON, R. E.
Pierced Steel Planking Surfacing for Feedlot Runoff Control,
W75-04644 5D

LARYEA, K. B.
A Nondestructive Method of Following Moisture Content and Temperature Changes in Soils Using Thermistors,
W75-04605 2G

LAU, L. S.
Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

LEANORD, B. R. JR.
High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

LECH, R. F.
Applicability of Control Strategies to the Activated Sludge Wastewater Treatment Process,
W75-04822 5D

LEE, E. S.
Optimal Weighting Function in Water Quality Modeling,
W75-04614 5B

LEE, H.
Closed-Loop Ozone Generating and Contacting System,
W75-04461 5D

LEE, H. W.
High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

LEE, T-F. D.
Diurnal Variations in Cloud Condensation Nuclei,
W75-04711 2B

LEETMAA, A.
Rotating Hydraulics of Strait and Sill Flows,
W75-04716 2L

LESSOR, D. L.
High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

LESTER, D. H.
Medical Uses of Isotopes,
W75-04417 5C

LEVI, D. R.
Philosophy on Livestock Waste Regulation,
W75-04838 5G

LEVIN, A. G.
About Vertical Gradients of Liquid Precipitation in Mountains,
W75-04668 2B

LEVIN, Z.
The Coalescence of Water Drops,
W75-04728 1A

LEVY, B.
Spectra of Precipitation Series in Mountainous Regions,
W75-04682 7A

LEVY, D.
On the Vulnerability of Ecosystems Disturbed by Man,
W75-04521 5C

LEWELLAN, T. K.
Nuclear Techniques in Medical Science,
W75-04412 5A

LEWIS, M. J.
Effects of Pollution on Freshwater Fish, (Literature Review),
W75-04848 5C

LEWIS, R. B.
Susceptibility of Grain Sorghum to Water Deficit at Three Growth Stages,
W75-04483 3F

LIAO, P. B.
Fluidized-Bed Sludge Incinerator Design,
W75-04428 5D

LIEB, D. F.
Method for Electrosanitizing Waste Water,
W75-04464 5D

LIGON, J. T.
Correlation of Hydrologic Model Parameters with Changing Land Use as Determined from Aerial Photographs,
W75-04448 4C

LIIKALA, R. C.
High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

LINDGREN, D. T.
Investigation of Land Use of Northern Megalopolis Using ERTS-1 Imagery,
W75-04726 7C

LINDLEY, M.
The Design and Promotion of a Scheme Using Mixed Water from the Rivers Ancholme, Witham and Trent for Industrial Supply to Humberside,
W75-04764 3E

LIROFF, R. A.
Economic Disincentives for Pollution Control: Legal, Political, and Administrative Disincentives,
W75-04576 5G

Used Oil Law in the United States and Europe,
W75-04575 5G

LODKIN, I. I.
The Problem of Organization of a Coastal Coordinating Computer Center,
W75-04732 7C

LOEHR, R. C.
Ammonia Desorption by Diffused Aeration,
W75-04812 5D

LOGAN, L. D.
Suspended Solids Carried by the Gallatin River of Southwestern Montana: Amounts Carried During Spring Runoff,
W75-04501 2J

LOPEZ, G.
Engineering a Victory for the Environment: A Citizen's Guide to the U.S. Army Corps of Engineers,
W75-04755 6G

LOWE, R. L.
Environmental Requirements and Pollution Tolerance of Freshwater Diatoms,
W75-04563 5C

LUDWIG, R. G.
Simplified Application of Palmer-Bowlus Flow Meters,
W75-04802 8B

LUNDBERG, E. A.
Utilization of the Earth's Natural Heating System to Desalt Geothermal Brines for Augmentation of the Colorado River System,
W75-04430 3A

LUTHIN, J. N.
Prediction of Drainage Requirements -- Buyuk Menderes River Basin, Turkey,
W75-04534 4A

MACAULEY, D. C.
Chemicals and Allied Products, (Literature Review),
W75-04474 5G

MACKAY, J. S.
High-Level Radioactivity Waste Management Alternatives - Section 8: Extraterrestrii Disposal,
W75-04408 5D

MACKENZIE, A. J.
The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

MADDEN, J. M.
Pierced Steel Planking Surfacing for Feedlot Runoff Control,
W75-04644 5D

MAHONEY, G. W. A.
Effect of Feedlot Laws and Climate on Open Feedlot Waste Management,
W75-04630 5D

MAJOR, G.
Sensitivity Distribution Along the Strips of Compensation Pyrheliometers,
W75-04796 7B

MALLEVIALLE, J.
Measurement of Hydrocarbons in Water: Application to Cases of Surface Water Pollution,
W75-04709 5A

MALOUF, J. B.
The Development of a Mathematical Model to Predict Runoff Water Quality from Watersheds,
W75-04551 5B

MANGAN, G. F. JR.
ASCE Urban Water Resources Research Program, 1967-1974,
W75-04440 4A

MANKKI, J.
Littoral Fish Populations After an Oil Tanker Disaster in the Finnish SW Archipelago,
W75-04487 5C

MANNERING, J. V.
Irrigation for Land Application of Animal Waste,
W75-04638 5D

MANNING, A. W.
Computer Control of Chemical Addition at a Water-Treatment Plant,
W75-04535 5F

MANSON, S. T.
Radiation Physics,
W75-04413 5C

MARTIN, D. M.
The Blockade 'Exception' To Territorial Water Jurisdiction,
W75-04766 6E

MARTIN, K. L.
Analyzing Biological Properties of Wastes,
W75-04842 5A

MASSENGALE, M. A.
Effect of Leaf Area Reduction on the Water Requirement of Barley (Hordeum Vulgare L.),
W75-04511 2I

MATHERS, A. C.
Effects of Cattle Feedlot Manure on Crop Yields and Soil Conditions,
W75-04833 5D

MATSUI, E.
Relative Rates of Flow of the Negro and Solimoes Rivers (Determined) Through O18 Concentrations, (In Porteguese),
W75-04495 2E

MATTER, F. S.
A Balanced Approach to Resource Extraction and Creative Land Development Associated with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

MAVINIC, D. S.
Bubble Size and Contact Time in Diffused Aeration Systems,
W75-04813 5D

MCCOMAS, F.
Fluoride Concentrations in Two Pacific Coast Inlets-An Indication of Industrial Contamination,
W75-04473 5B

MCELROY, A. D.
Nonpoint Agricultural Pollution: Status of Assessment Methodology,
W75-04645 5B

MCERLEAN, A. J.
Abundance, Diversity and Seasonal Patterns of Estuarine Fish Populations,
W75-04485 5C

MCKEE, R. W.
Medical Grade Plutonium-238 From Americium-241,
W75-04418 5C

Population Radiation Exposure,
W75-04420 5C

MCKIM, J. M.
Effects of Pollution on Freshwater Fish, (Literature Review),
W75-04848 5C

MCKINNEY, R. W.
Methods for Elimination of Oil Slicks,
W75-04455 5G

MCLAUGHLIN, S. J.
TV Inspections Slash Sewer Costs $300 per Repair,
W75-04830 5G

MCPARTLAND, J. T.
Atmospheric Water Resources Management Program - Bridger Range Cloud Seeding Experiment,
W75-04721 3B

MCPHERSON, M. B.
ASCE Urban Water Resources Research Program, 1967-1974,
W75-04440 4A

MEEK, B. D.
The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

MEHROTRA, S. C.
An Alternative Formulation of the Problem of Density Jump,
W75-04797 8B

MEHTA, S. C.
Virological Studies in Water Systems: Natural Occurrence of Reoviruses and Their Inactivation by Physical and Chemical Agents,
W75-04821 5F

MEIER, P. M.
An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

MELDRIM, J. W.
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

MERCURI, A. J.
A Study of the Waste Wash Water from Egg Washing Machines,
W75-04475 5B

MEREDITH, D. D.
Optimal Operation of Multiple Reservoir System,
W75-04532 4A

A Two-Dimensional Multi-Stage Programming Model: With Application to Reservoir Systems,
W75-04523 4A

MERSICH, I.
Sensitivity Distribution Along the Strips of Compensation Pyrheliometers,
W75-04796 7B

METZGER, J. B.
Manual for Deicing Chemicals: Application Practices,
W75-04567 5G

Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

MEYER, J. L.
Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

MIHURSKY, J. A.
Abundance, Diversity and Seasonal Patterns of Estuarine Fish Populations,
W75-04485 5C

MILLER, D. W.
Calculation of the Drainage Component of Soil Water Depletion,
W75-04374 2G

MILLER, J. F.
Physiographically Adjusted Precipitation-Frequency Maps,
W75-04672 2B

MILLER, R. D.
Turbidity Removal Using Polymers and Activated Carbon,
W75-04820 5F

MILNE, G. A.
Sewage Treatment System,
W75-04456 5D

MISKOLCI, F.
Sensitivity Distribution Along the Strips of Compensation Pyrheliometers,
W75-04796 7B

MISRA, P. K.
Optimal Weighting Function in Water Quality Modeling,
W75-04614 5B

MITCHELL, V. L.
Atmospheric Water Resources Management Program - Bridger Range Cloud Seeding Experiment,
W75-04721 3B

MOMMESSIN, P. R.
Chemical and Physical Characterization of Tar Samples from the Marine Environment,
W75-04718 5A

MONTZ, G. N.
An Ecological Study of a Baldcypress Swamp in St. Charles Parish, Louisiana,
W75-04364 2H

MOONEY, H. A.
Comparative Photosynthetic Capacities of Intertidal Algae Under Exposed and Submerged Conditions,
W75-04524 5C

MORRISON, S. M.
Analyzing Biological Properties of Wastes,
W75-04842 5A

MOUNTAIN, P. T.
Engineering a Victory for the Environment: A Citizen's Guide to the U.S. Army Corps of Engineers,
W75-04755 6G

MUCHIN, V. M.
Snow Survey and Methods for Snow Storage Estimation in Mountain River Basins of the Soviet Union,
W75-04659 2C

MULLER, C. H.
Dominance of California Annual Grasslands by Brassica Nigra,
W75-04435 2I

MULLINER, H. R.
The Design of a Livestock Water Distribution System--Large Scale,
W75-04527 3F

MUSIL, R.
Nitrogen Fixation (Acetylene Reduction) by Phytoplankton in Green Bay, Lake Michigan, in Relation to Nutrient Concentrations,
W75-04498 5C

NACHTWEY, D. S.
Radiation Biophysics,
W75-04415 5C

NAGURNYY, A. P.
Estimate of Heat Fluxes on the Subjacent Surface (According to Data from Synoptic Analysis),
W75-04737 7C

NAIKSATAM, A. S.
Note on Growth of the Bream, Abramis Brama (Linnaeus, 1758) in the Orlik Valley Water Reservoir,
W75-04493 2I

NASH, N.
Sources of Metals in New York City Wastewater,
W75-04805 5B

NEAL, A. M. JR.
The International Seabed Regime: Proposals and Prospects for Realization,
W75-04767 6E

NEAL, L. A.
Oxygen Sag and Stream Purification, (Literature Review),
W75-04849 5B

NELEPO, B. A.
Error in Interpolation and Choice of the Range of Discreteness in Measurements in a Hydrophysical Field,
W75-04734 7A

NELP, W. P.
Nuclear Techniques in Medical Science,
W75-04412 5A

NELSON, G. R.
Water Recycle/Reuse Possibilities: Power Plant Boiler and Cooling Systems,
W75-04566 5D

NICHOLS, JEAN ANN
Benthic Community Respiration Near the Woods Hole Sewage Outfall,
W75-04503 5C

NIELSEN, D. R.
The Combined Effects of Infiltration and Redistribution on Leaching,
W75-04606 2G

NIELSEN, J. M.
Pacific Northwest Laboratory Annual Report for 1973 to the USAEC Division of Biomedical and Environmental Research Part 4. Physical and Analytical Sciences,
W75-04410 5C

NISHITA, H.
Distribution of Different Forms of Nitrogen in Some Desert Soils,
W75-04373 2G

NORRISH, K.
Silicon Content of Wheat Husks in Relation to Water Transpired,
W75-04484 2D

NUTTER, W. L.
The Varying Source Area of Streamflow from Upland Basins,
W75-04358 4D

NYE, J. C.
Irrigation for Land Application of Animal Waste,
W75-04638 5D

O'BRIEN, K. H.
Development of Guidelines for the Design of Subsurface Drainage Systems for Highway Pavement Structural Sections,
W75-04809 8A

O'CONNOR, S. G.
Abundance, Diversity and Seasonal Patterns of Estuarine Fish Populations,
W75-04485 5C

OLIVER, J. C.
Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

ONAT, E.
Solubility Studies of Metallic Mercury in Pure Water at Various Temperatures,
W75-04815 5A

ORLANDO, J. A.
A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

ORR, D. V.
Effects of Agricultural Acreage Reduction on Water Availability and Salinity in the Upper Colorado River Basin,
W75-04368 6B

OTIS, R. J.
Uniform Distribution in Soil Absorption Fields,
W75-04807 5D

PAINE, M.
Effect of Feedlot Laws and Climate on Open Feedlot Waste Management,
W75-04630 5D

PALLESEN, L. C.
Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

PALMER, H. E.
Nuclear Techniques in Medical Science,
W75-04412 5A

PAN, P. S.
Precipitation in Taiwan Mountainous Areas,
W75-04675 2B

PAPENDICK, R. I.
Effectiveness of Two Nitrification Inhibitors for Anhydrous Ammonia Under Irrigated and Dryland Conditions,
W75-04425 5G

PARETZKE, H. G.
Radiation Physics,
W75-04413 5C

PARKHURST, J. D.
Simplified Application of Palmer-Bowlus Flow Meters,
W75-04802 8B

PARLANGE, J-Y.
Two-Dimensional Water Infiltration from a Trench in Unsaturated Soils,
W75-04700 2G

PECK, E. L.
Relation of Orographic Winter Precipitation Patterns to Meteorological Parameters,
W75-04670 2

PEDERSEN, K.
Orographic Influences on Distribution of Precipitation,
W75-04664 2B

PEGRAM, G. G. S.
Expectation and Dispersion Matrices for the Estimation of Distributions Associated with Discrete Reservoirs,
W75-04525 4A

PEJLER, B.
The Effect of Cooling Water Discharges on Zooplankton in a Bay of Lake Malaren,
W75-04496 5C

PENDERGRASS, J.
The Law of Maritime Oil Spills,
W75-04770 6E

PETER, K. D.
Method and Apparatus for Producing a Distillate,
W75-04465 3A

PETERSON, R. E.
Geothermal Wells in Imperial Valley, California: Desalting Potentials, Historical Development, and A Selected Bibliography,
W75-04423 3A

PETERSON, W. D.
Removal of Boron From Water,
W75-04462 5D

PETROSKY, B. R.
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

PHANTUMVANIT, D.
Simulation and Statistical Quality Control for Water Pollution Abatement,
W75-04557 5G

PICK, P. E.
Solid Adsorbents for Gas and Liquid Treatment,
W75-04826 5D

PIEST, R. F.
Soil Erosion and Sediment Transport from Gullies,
W75-04707 2J

PITTMAN, B. W.
The Marine Environment and Toxic Substances (When was the Last Time You had a Good Swordfish Steak),
W75-04768 6E

PLANER, G. A.
The Disposal of Radioactive Wastes Into the Sea: Some International Legal Considerations,
W75-04769 6E

PLESKO, N.
Maximum Daily Precipitation in Gorski Kotar and Lika (Yugoslavia) in Relation to the Overflying Air-Stream,
W75-04666 2B

POOLE, W. H.
Settling Basin Design for Raceway Fish Production Systems,
W75-04646 5D

POON, C. P. C.
Electrochemical Process for Nutrient Removal,
W75-04446 5D

POPP, L.
Salmonella and Natural Purification of Polluted Waters, (In German),
W75-04578 5C

PORTER, L.
Radiation Physics,
W75-04413 5C

PRIHAR, S. S.
Comparison of Banded and Broadcast Fertilizer Applications in Relation to Compaction and Irrigation in Maize and Wheat,
W75-04611 3F

QUAN, D. A.
Application of the Main II Water Forecasting System to Wyoming Communities,
W75-04541 6D

QUAN, E. L.
Subsurface Sewage Disposal and Contamination of Ground Water in East Portland, Oregon,
W75-04798 5B

QUIGLEY, T. M.
Economics of Fertilizer Application on Range and Meadow Sites in Utah,
W75-04388 2I

QUINN, J. G.
Petroleum Hydrocarbons in Narragansett Bay: I. Survey of Hydrocarbons in Sediments and Clams (Mercenaria Mercenaria),
W75-04477 5B

RAIA, J. C.
Chemical and Physical Characterization of Tar Samples from the Marine Environment,
W75-04718 5A

RAINER, R. K.
Will Current Research Answer Today's Problems at the Sanitary Landfill.,
W75-04800 5B

RANCITELLI, L. A.
Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

REDDELL, D. L.
Water Quality of Storm Runoff from a Texas Beef Feedlot,
W75-04843 5B

REDMORE, D.
Water Clarification with Nitrogen-Heterocyclic Phosphonic Acids,
W75-04457 5D

REINERS, W. A.
Deposition of Water and Cations on Artificial Foliar Collectors in Fir Krummholz of New England Mountains,
W75-04471 2K

REINHORN, T.
Nitrogen Release Associated with the Decrease in Soil Organic Matter in Newly Cultivated Soils,
W75-04367 5B

REISENAUER, A. E.
Lysimeter Experiment Description and Progress Report on Neutron Measurements,
W75-04725 2D

RENARD, K. G.
Infiltration for Three Rangeland Soil-Vegetation Complexes,
W75-04377 2G

RESIDE, J.
The World's Largest Desalting Complex--A Report on Twenty Years Experience,
W75-04422 3A

RHODES, R. A.
Enterobacteria in Feedlot Waste and Runoff,
W75-04633 5A

RIBLE, J. M.
Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

RICHARDSON, D. L.
Manual for Deicing Chemicals: Application Practices,
W75-04567 5G

Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

RICHERSON, P.
Environmental Values and Water Quality Planning,
W75-04530 5G

RIEDEL, J. T.
Extreme Thunderstorm Rainfall in the Intermountain Western United States,
W75-04677 2B

RIEMATH, W. F.
Medical Uses of Isotopes,
W75-04417 5C

RILEY, J. P.
A Hybrid Computer Simulation Model for Predicting the Effects of the Areal Distribution of Precipitation on Runoff Characteristics,
W75-04692 2B

RINGLER, T. A.
Flood Hazard Reports: Tools for Resource Planning and Management,
W75-04432 4A

RISK, N. E.
Groundwater Pumpage in Northern Illinois, 1960-1970,
W75-04727 4B

RITCHIE, J. T.
A Method for Measuring First-Stage Soil Water Evaporation in the Field,
W75-04698 2D

ROBERTSON, J.
Organic Compounds Entering Ground Water from a Landfill,
W75-04573 5B

RODKIEWICZ, C. M.
Bifurcation Characteristic Reynolds Number,
W75-04715 8B

ROESCH, W. C.
Radiation Biophysics,
W75-04415 5C

Radiation Dosimetry,
W75-04414 5C

ROHATGI, N.
Trace Metals in Wastewater Effluents,
W75-04806 5B

ROMANTSOV, V. A.
A System of Automated Processing of Deep Water Hydrological Information,
W75-04733 7C

ROOD, O. E.
A Two-Dimensional Multi-Stage Programming Model: With Application to Reservoir Systems,
W75-04523 4A

ROSEN, H. M.
Closed-Loop Ozone Generating and Contacting System,
W75-04461 5D

ROWE, GILBERT T.
Benthic Community Respiration Near the Woods Hole Sewage Outfall,
W75-04503 5C

RUML, D. J.
Investigation of Land Use of Northern Megalopolis Using ERTS-1 Imagery,
W75-04726 7C

RUSSO, D.
Water Uptake by Seeds as Affected by Water Stress, Capillary Conductivity, and Seed-Soil Water Contact. I. Experimental Study and, II. Analysis of Experimental Data,
W75-04381 2I

RYAN, J. L.
High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

RYDEN, B. E.
On the Problem of Vertical Distribution of Precipitation, Especially in Areas with Great Height Differences,
W75-04680 2B

RYSKIEWICH, B. S.
An Experimental Study of the Free Surface Effect on a Buoyant Jet,
W75-04559 8B

SADOWSKY, V.
The Occurrence of Young Sardinella Aurita in the Brackish Water of the Lagoons of Cananeia (Brazil), (In German),
W75-04492 2L

SALATI, E.
Relative Rates of Flow of the Negro and Solimoes Rivers (Determined) Through O18 Concentrations, (In Porteguese),
W75-04495 2E

SALSTEIN, D. A.
Channel Flow Driven by a Stationary Thermal Source,
W75-04793 8B

SALTER, P. M.
Areal Rainfall Analysis by Computer,
W75-04687 7C

SANDER, F.
Internal Waves as Causative Mechanisms of Island Mass Effects,
W75-04481 5C

SASAKI, B. R.
A Regional Model of the Future Demand For Transportation: The Case of Barge Transportation,
W75-04520 6A

SASMAN, R. T.
Groundwater Pumpage in Northern Illinois, 1960-1970,
W75-04727 4B

SATO, K.
Sphere Method Turbidimeter,
W75-04819 5A

SAVAGE, S. M.
Mechanism of Fire-Induced Water Repellency in Soil,
W75-04515 2G

SAVCHENKO, V. G.
The Problem of the Influence of Ocean Currents on Free Internal Gravity Waves,
W75-04739 2L

SAWHNEY, B. L.
Two-Dimensional Water Infiltration from a Trench in Unsaturated Soils,
W75-04700 2G

SCHAFER, C. J.
Complying with Discharge Regulations,
W75-04431 5G

SCHAPLER, F. L.
Pierced Steel Planking Surfacing for Feedlot Runoff Control,
W75-04644 5D

SCHERZ, J. P.
Water Quality by Photographic Analysis,
W75-04814 5A

SCHICKEDANZ, P. T.
Inadvertent Rain Modification as Indicated by Surface Raincells,
W75-04703 2B

SCHLESINGER, W. H.
Deposition of Water and Cations on Artificial Foliar Collectors in Fir Krummholz of New England Mountains,
W75-04471 2K

SCHMIDT, C. J.
Wastewater Characterization for the Specialty Food Industry,
W75-04560 5B

SCHNEIDERMAN, M. H.
Radiation Biophysics,
W75-04415 5C

SCHON, E. A.
Trickling Filtration of a Waste Containing NTA,
W75-04427 5D

SCHREIBER, A.
Apparatus for the Filtration and Biological Purification of Contaminated Water,
W75-04454 5D

SCHREIBER, B.
Apparatus for the Filtration and Biological Purification of Contaminated Water,
W75-04454 5D

SCHREIBER, E.
Apparatus for the Filtration and Biological Purification of Contaminated Water,
W75-04454 5D

SCHULZE, F. E.
The Rising Water Table in the West Nubarya Area of Egypt,
W75-04363 4B

SCHUMAN, S. P.
A Balanced Approach to Resource Extraction and Creative Land Development Associated with Open-Pit Copper Mining in Southern Arizona,
W75-04510 5G

SCOTTER, D. R.
Salt and Water Movement in Relatively Dry Soil,
W75-04516 2G

SEARCY, G. K.
A Study of the Waste Wash Water from Egg Washing Machines,
W75-04475 5B

SEARLE, L.
Manure Handling Systems for the Future,
W75-04635 5D

SEO, K. K.
Geothermal Wells in Imperial Valley, California: Desalting Potentials, Historical Development, and A Selected Bibliography,
W75-04423 3A

SEREBRENY, S. M.
Precipitation Estimates from Meteorological Satellite Data,
W75-04685 2B

SEVRUK, B.
Evaporation Losses from Storage Gauges,
W75-04657 7B

Precipitation Measurements by Means of Storage Gauges with Stereo and Horizontal Orifices in the Baye De Montreux Watershed,
W75-04656 7B

SHAW, E. M.
A Hydrological Assessment of Precipitation in the Western Highlands of New Guinea,
W75-04690 2B

SHERARD, D. R.
Determination of the Thickness of Petroleum Films on Water,
W75-04723 5A

SHIH, C. Y.
Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

SHIMKO, A. N.
Pneumatic Transportation of Manure,
W75-04641 5D

SHOSTAK, A. B.
A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

SHUBERT, R. H.
Method for Treatment of Coal Washery Waters,
W75-04463 5D

SIMPSON, R. B.
Investigation of Land Use of Northern Megalopolis Using ERTS-1 Imagery,
W75-04726 7C

SINGH, K. S.
Effect of Qualities of Irrigation Water and Fertilizers on Soil Properties, Yield and Nutrient Uptake by Wheat,
W75-04482 3F

SINIK, N.
A Possibility of Airflow - Precipitation Regime Investigations,
W75-04660 2B

SKAAR, E.
Distribution of Precipitation in the Sognefjord Region,
W75-04665 2B

SMID, A. E.
A Leak-Proof Sampling Port in Gas Analyses Studies,
W75-04697 7B

SMITH, C. S. JR.
Process and Apparatus for Separating Water From Non-Volatile Solutes,
W75-04451 3A

SMITH, J. L.
Development of an Organic Waste Slurry Injector,
W75-04616 5D

SMITH, K. L. JR.
Benthic Community Respiration Near the Woods Hole Sewage Outfall,
W75-04503 5C

SMITH, R. D.
Atmospheric Moisture Parameterization,
W75-04724 2B

SMITH, R. J.
A Prototype System to Renovate and Recycle Swine Wastes Hydraulically,
W75-04542 5D

SMITH, R. L. JR.
Are we Ready for a Closed System of Water Supply, Treatment, and Reuse - Technology vs. Psychology,
W75-04761 5D

SOLOMON, J.
The Social Redemption of Pure Garbage,
W75-04553 5D

SONA, K.
Activated Sludge Bulking (In Japanese),
W75-04824 5D

SPALDING, J. F.
Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

SPENCER, W. F.
The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

SRINATH, E. G.
Ammonia Desorption by Diffused Aeration,
W75-04812 5D

ST, H. S.
Updating Aging Sewers Without Trenching,
W75-04828 5D

ST, P. P.
Methods of Removing Nitrates From Water,
W75-04626 5D

STAFFORD, D. B.
Correlation of Hydrologic Model Parameters with Changing Land Use as Determined from Aerial Photographs,
W75-04448 4C

STAMM, G. G.
The Role of Water and Land Resources in Alleviating Malnutrition and Hunger in Arid Regions,
W75-04603 6B

STANSELL, J. R.
Effect of Root Pruning on Water Relations and Growth of Cotton,
W75-04613 2I

STEFAN, H.
Temperature Dynamics in Dimictic Lakes,
W75-04705 2H

STEFANSON, R. C.
Polyvinyl Alcohol as a Stabilizer of Surface Soil,
W75-04607 2G

STEPANYUK, V. A.
The Problem of Selecting an Optimum Frequency for a Measuring Generator in Determining the Value of the Hydrophysical Parameter with a Given Accuracy,
W75-04735 7B

STEPHENSON, D. A.
Nutrient Enrichment of Groundwater from Septic Tank Disposal Systems,
W75-04758 5C

STEVENS, J. H.
Stabilization of Aeolian Lands in Saudi Arabia's Al Hasa Oasis,
W75-04512 3C

STEWART, B. A.
Amounts, Composition, and Management of Feedlot Runoff,
W75-04835 5D

Effects of Cattle Feedlot Manure on Crop Yields and Soil Conditions,
W75-04833 5D

Feedlot Waste Effects on Soil Conditions and Water Evaporation,
W75-04699 5B

STILLMAN, N. W.
Method for Electrosanitizing Waste Water,
W75-04464 5D

STOKES, H. B. JR.
Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

STOKES, H. W.
Tertiary Treatment: The Wrong Solution to a Non-Problem,
W75-04811 5D

STONE, H. E.
Dry Caustic Peeling of Clingstone Peaches on a Commercial Scale,
W75-04564 5D

STORR, D.
The Distribution of Precipitation in Some Mountainous Canadian Watersheds,
W75-04671 2B

STRONG, A. L.
Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

SUAREZ, M. J.
Simple Albedo Feedback Models of the Icecaps,
W75-04794 2C

SUMNER, J. S.
A Geophysical and Geological Investigation of Potentially Favorable Areas for Petroleum Exploration in Southeastern Arizona,
W75-04509 2J

SUPER, A. B.
Atmospheric Water Resources Management Program - Bridger Range Cloud Seeding Experiment,
W75-04721 3B

SUTTON, J. D.
Differences Between Planned and Actual Costs and Benefits in Small Watershed Development,
W75-04433 4D

SWEAZY, R. M.
Nitrogen Mass Balance Determination for Simulated Wastewater Land-Spreading Operations,
W75-04449 5D

SWEET, H. R.
Subsurface Sewage Disposal and Contamination of Ground Water in East Portland, Oregon,
W75-04798 5B

SWEETEN, J. M.
Future Developments in Feedlot Waste Management,
W75-04836 5D

SWIFT, W. H.
High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

TAIGANIDES, E. P.
Coprology: A Pollution Solution,
W75-04545 5D

TALSMA, T.
The Effect of Initial Moisture Content and Infiltration Quantity of Redistribution of Soil Water,
W75-04517 2G

TASH, J. C.
Freshwater Jellyfish (Craspedacusta Sowerbyi) in Lake Patagonia, Southern Arizona,
W75-04386 8I

TAYLOR, F. W.
Recovery of Potable Water From Sanitary Waste Using Solid Wastes and Refuse as a Heat Source,
W75-04458 5D

TELLER, C. J.
Farms are Not in the Country Any More,
W75-04546 5D

TERRY, R. C.
Manual for Deicing Chemicals: Application Practices,
W75-04567 5G

THATCHER, A. P.
Infiltration for Three Rangeland Soil-Vegetation Complexes,
W75-04377 2G

Spy Mesa Yields Better Understanding of Pinyon-Juniper in Range Ecosystem,
W75-04375 2I

THOMAS, C. W.
Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

THOMAS, G. W.
The Unreliability of Tile Effluent for Monitoring Subsurface Nitrate-Nitrogen Losses from Soils,
W75-04438 5B

THOMAS, J. D.
Effects of Cattle Feedlot Manure on Crop Yields and Soil Conditions,
W75-04833 5D

THOMPSON, J.
Fluoride Concentrations in Two Pacific Coast Inlets-An Indication of Industrial Contamination,
W75-04473 5B

THOMPSON, J. R.
Energy Budget Measurements Over Three Cover Types in Eastern Arizona,
W75-04383 2I

THURLOW, D. L.
Irrigation, Row width, and Plant Population in Relation to Growth Characteristics of Two Soybean Varieties,
W75-04369 3F

TIETJEN, G. L.
Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

TILLSON, D. D.
High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

TIMMONS, J. F.
An Economic Analysis of Agricultural Land Use Practices to Control Water Quality,
W75-04526 5G

TOBUREN, L. H.
Radiation Physics,
W75-04413 5C

TOLLNER, H.
Influence of Orography on the Share of Precipitation in the East Alpine High Mountains,
W75-04679 2B

TOUSSAINT, C. R.
Organic Compounds Entering Ground Water from a Landfill,
W75-04573 5B

TRNOVSKY, M.
Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

TROMBLE, J. R.
Infiltration for Three Rangeland Soil-Vegetation Complexes,
W75-04377 2G

TSCHESCHKE, P.
Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04391 2C

Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04507 2G

TUCKER, J. H.
Asbestiform Amphibole Minerals: Detection and Measurement of High Concentrations in Municipal Water Supplies,
W75-04818 5A

Effects of Pollution on Freshwater Fish, (Literature Review),
W75-04848 5C

TURKEL, E.
Frontal Motion in the Atmosphere,
W75-04792 2B

TURNER, D. O.
Manure Application Guidelines for the Pacific Northwest,
W75-04631 5G

UECKERT, D. N.
Wood Boring Insect Infestations in Relation to Mesquite Control Practices,
W75-04380 3B

UHLER, K. A.
Identification and Evaluation of Water Tracers Amenable to Post-Sampling Neutron Activation Analysis,
W75-04355 5A

UNGER, P. W.
Feedlot Waste Effects on Soil Conditions and Water Evaporation,
W75-04699 5B

UNZ, R. F.
Bacterial Zoogloea Formation,
W75-04572 5D

UPCHURCH, S. B.
Sampling of Variable, Waste-Migration Patterns in Ground Water,
W75-04799 5B

UTHMAN, F.
Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

VAHL, H.
Computerized Calculation of Areal Precipitation and Its Accuracy,
W75-04688 7C

VAN DER PLOEG, R. R.
Simulation of Moisture Transfer in Soils: One-Dimensional Infiltration,
W75-04695 2G

Unsteady, Unsaturated, N-Dimensional Moisture Flow in Soil: A Computer Simulation Program,
W75-04701 2G

VAN EPPS, G. A.
Control of Gambel Oak with Three Herbicides,
W75-04366 3B

VAN MAREN, MARION J.
Distribution and Ecology of Amphipodes (Especially Gammarides) in the Basin and Estuary of the Dourduff River (Brittany, France), (In French),
W75-04488 2I

VANDERHOEF, L. N.
Nitrogen Fixation (Acetylene Reduction) by Phytoplankton in Green Bay, Lake Michigan, in Relation to Nutrient Concentrations,
W75-04498 5C

VAURAS, J.
Littoral Fish Populations After an Oil Tanker Disaster in the Finnish SW Archipelago,
W75-04487 5C

VOLK, V. V.
Manure Application Guidelines for the Pacific Northwest,
W75-04631 5G

VUGLINSKI, V. S.
Methods for the Study of Laws for the Distribution of Precipitation in Medium-High Mountains (Illustrated by the Vitim River Basin),
W75-04669 2B

WALKER, W. G.
Uniform Distribution in Soil Absorption Fields,
W75-04807 5D

WALLACE, R. W.
High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

WALLICK, E. I.
Isotopic and Chemical Considerations in Radiocarbon Dating of Groundwater Within the Arid Tucson Basin, Arizona,
W75-04647 7B

WANG, L. K.
Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

WANG, M. H.
Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

WARD, R. C.
Routine Surveillance Alternatives for Water Quality Management,
W75-04803 5A

WARE, G. W.
Ecological History of DDT in Arizona,
W75-04387 5C

WARMAN, J. C.
Planning, Management and Accountability in Water Resources Research,
W75-04439 6B

Will Current Research Answer Today's Problems at the Sanitary Landfill.,
W75-04800 5B

WASSERMAN, C.
The Brandywine: Five Years After,
W75-04360 6B

WATSON, J. R.
Reducing Feedlot Nitrates in Your Ground Water,
W75-04547 5B

WATSON, W. D. JR.
Enforcement Economics in Air Pollution Control,
W75-04569 5G

WELBORN, H. L.
Surge Facility for Wet and Dry Weather Flow Control,
W75-04562 5D

WELLS, D. M.
Nitrogen Mass Balance Determination for Simulated Wastewater Land-Spreading Operations,
W75-04449 5D

WENZEL, H. G.
Control Strategy Development Study, San Francisco Wastewater Master Plan,
W75-04352 5D

WHEATON, R. Z.
Irrigation for Land Application of Animal Waste,
W75-04638 5D

WHITEHEAD, J. A.
Rotating Hydraulics of Strait and Sill Flows,
W75-04716 2L

WIEBE, P. H.
Acid-Iron Waste as a Factor Affecting the Distribution and Abundance of Zooplankton in the New York Bight: II. Spatial Variations in the Field and Implications for Monitoring Studies,
W75-04574 5B

WIERSMA, J. L.
Pierced Steel Planking Surfacing for Feedlot Runoff Control,
W75-04644 5D

WILCOX, L. C.
A systems Analysis of Water Quality Survey Design,
W75-04522 5B

WILLIAMS, J.
Nitrogen Fixation (Acetylene Reduction) by Phytoplankton in Green Bay, Lake Michigan, in Relation to Nutrient Concentrations,
W75-04498 5C

WILLIAMS, L.
Hail and Its Distribution,
W75-04604 2C

WILLRICH, T. L.
Manure Application Guidelines for the Pacific Northwest,
W75-04631 5G

WILSON, R.
Wastewater analysis and its Relation to Company Profits,
W75-04817 5A

WILSON, R. S.
The Use of Chironomid Pupal Exuviae for Characterizing Streams,
W75-04371 5B

WILSON, S. K.
Some Characteristics of Hawaiian High-Intensity Rainfall,
W75-04442 2B

WILSON, T. E.
Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

WILSON, W. E.
Radiation Physics,
W75-04413 5C

WINSTANLEY, D.
Rainfall Patterns and General Atmospheric Circulation,
W75-04513 2B

WISE, G. G.
Water Quality of Storm Runoff from a Texas Beef Feedlot,
W75-04843 5B

WOGMAN, N. A.
Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

WOLLA, M.
A systems Analysis of Water Quality Survey Design,
W75-04522 5B

WOODY, W. M.
Effectiveness of Two Nitrification Inhibitors for Anhydrous Ammonia Under Irrigated and Dryland Conditions,
W75-04425 5G

WORKMAN, J. P.
Economics of Fertilizer Application on Range and Meadow Sites in Utah,
W75-04388 2I

WRIGHT, H. A.
Wood Boring Insect Infestations in Relation to Mesquite Control Practices,
W75-04380 3B

WRIGHT, J. F.
Water Quality Control--The Role of the Interstate Agency,
W75-04596 5G

WUNZ, E. C.
Dewatering Bovine Animal Manure,
W75-04627 5D

WYATT, G. M.
Soil Erosion and Sediment Transport from Gullies,
W75-04707 2J

YOUNG, C. S.
Trace Metals in Wastewater Effluents,
W75-04806 5B

ZAFIRIOU, O. C.
Petroleum Hydrocarbons in Narragansett Bay: II. Chemical and Isotopic Analysis,
W75-04478 5B

ZAHNER, R.
Fascicle Density and Needle Growth Responses of Red Pine to Water Supply Over Two Seasons,
W75-04424 2I

ZHIDIKOV, A. P.
About Vertical Gradients of Liquid Precipitation in Mountains,
W75-04668 2B

ZUDIN, O. F.
Error in Interpolation and Choice of the Range of Discreteness in Measurements in a Hydrophysical Field,
W75-04734 7A

ORGANIZATIONAL INDEX

ABRAHAM BALDWIN AGRICULTURAL COLL., TIFTON, GA.
Water Quality of Storm Runoff from a Texas Beef Feedlot,
W75-04843 5B

AD HOC PANEL OF THE ADVISORY COMMITTEE ON TECHNOLOGY INNOVATION, BOARD ON SCIENCE AND TECHNOLOGY FOR INTERNATIONAL DEVELOPMENT, COMMISSION ON INTERNATIONAL RELATIONS.
More Water for Arid Lands, Promising Technologies and Research Opportunities.
W75-04508 3B

ADELPHI UNIV., OAKDALE, N.Y. INST. OF MARINE SCIENCE.
Dissolved and Particulate Humic Acid in an East Coast Estuary,
W75-04504 5B

AGRICULTURAL RESEARCH SERVICE, BATON ROUGE, LA.
Raindrop Characteristics in South Central United States,
W75-04713 2B

AGRICULTURAL RESEARCH SERVICE, BELTSVILLE, MD. HYDROGRAPH LAB.
Spectra of Precipitation Series in Mountainous Regions,
W75-04682 7A

AGRICULTURAL RESEARCH SERVICE, BRAWLEY, CALIF. IMPERIAL VALLEY CONSERVATION RESEARCH CENTER.
The Effect of Large Applications of Manure on Movement of Nitrate and Carbon in an Irrigated Desert Soil,
W75-04370 5G

AGRICULTURAL RESEARCH SERVICE, CHICKASHA, OKLA.
Oversaturation Method for Preparing Saturation Extracts for Salinity Appraisal,
W75-04392 2G

AGRICULTURAL RESEARCH SERVICE, COLUMBIA, WATERSHED RESEARCH UNIT.
Soil Erosion and Sediment Transport from Gullies,
W75-04707 2J

AGRICULTURAL RESEARCH SERVICE, LOGAN, UTAH.
Range Plant Yield and Species Relationships in Natural and Partially Controlled Environments,
W75-04378 2I

AGRICULTURAL RESEARCH SERVICE, OXFORD, MISS. SEDIMENTATION LAB.
Sediment Trap Efficiency of Small Reservoirs,
W75-04702 2J

AGRICULTURAL RESEARCH SERVICE, PEORIA, ILL. NORTHERN MARKETING AND NUTRITION RESEARCH DIV.
Enterobacteria in Feedlot Waste and Runoff,
W75-04633 5A

AGRICULTURAL RESEARCH SERVICE, PHOENIX, ARIZ. WATER CONSERVATION LAB.
Tornado or Dust Devel: The Enigma of Desert Whirlwinds,
W75-04372 2B

AGRICULTURAL RESEARCH SERVICE, PROSSER, WASH.
Calculation of the Drainage Component of Soil Water Depletion,
W75-04374 2G

AGRICULTURAL RESEARCH SERVICE, PULLMAN, WASH.
Effectiveness of Two Nitrification Inhibitors for Anhydrous Ammonia Under Irrigated and Dryland Conditions,
W75-04425 5G

AGRICULTURAL RESEARCH SERVICE, RIVERSIDE, CALIF. SALINITY LAB.
Drainage for Agriculture,
W75-04537 3F

AGRICULTURAL RESEARCH SERVICE, TEMPLE, TEX. BLACKLAND CONSERVATION RESEARCH CENTER.
A Method for Measuring First-Stage Soil Water Evaporation in the Field,
W75-04698 2D

AGRICULTURAL RESEARCH SERVICE, TUCSON, ARIZ. SOUTHWEST WATERSHED RESEARCH CENTER; AND SOIL CONSERVATION SERVICE, PHOENIX, ARIZ.
Infiltration for Three Rangeland Soil-Vegetation Complexes,
W75-04377 2G

ALBERTA UNIV., EDMONTON.
Bifurcation Characteristic Reynolds Number,
W75-04715 8B

ALL-UNION RESEARCH INST. OF CATTLE-BREEDING, PODOLSK (USSR).
Pneumatic Transportation of Manure,
W75-04641 5D

AMERICAN CRYSTAL SUGAR CO., DENVER, COLO.
Separation, Dewatering and Disposal of Sugarbeet Transport Water Solids, (Phase I),
W75-04565 5D

AMERICAN FROZEN FOOD INST., WASHINGTON, D.C.
Wastewater Characterization for the Specialty Food Industry,
W75-04560 5B

AMERICAN SOCIETY OF CIVIL ENGINEERS, NEW YORK.
ASCE Urban Water Resources Research Program, 1967-1974,
W75-04440 4A

AMERICAN WATER WORKS ASSOCIATION, NEW YORK. COMMITTEE ON RESEARCH.
Coagulation-Filtration Practice as Related to Research.
W75-04825 5D

AMERICAN WATER WORKS ASSOCIATION, NEW YORK, RESEARCH COMMITTEE ON DISTRIBUTION SYSTEMS.
Water-Distribution Research and Applied Development Needs.
W75-04763 6B

AMSTERDAM UNIV. (NETHERLANDS). INST. OF TAXONOMIC ZOOLOGY.
Distribution and Ecology of Amphipodes (Especially Gammarides) in the Basin and Estuary of the Dourduff River (Brittany, France), (In French),
W75-04488 2I

ARIZONA COOPERATIVE FISHERY UNIT, TUCSON.
Freshwater Jellyfish (Craspedacusta Sowerbyi) in Lake Patagonia, Southern Arizona,
W75-04386 8I

ARIZONA UNIV., TUCSON.
Ecological History of DDT in Arizona,
W75-04387 5C

Effect of Leaf Area Reduction on the Water Requirement of Barley (Hordeum Vulgare L.),
W75-04511 2I

ARIZONA UNIV., TUCSON. DEPT. OF GEOSCIENCES.
Isotopic and Chemical Considerations in Radiocarbon Dating of Groundwater Within the Arid Tucson Basin, Arizona,
W75-04647 7B

ARIZONA UNIV., TUCSON. DEPT. OF SOILS, WATER, AND ENGINEERING.
Some Effects of Subirrigation on Bentgrass During Heat Stress in the Field,
W75-04612 2I

ARIZONA UNIV., TUCSON. GEOPHYSICS LAB.
A Geophysical and Geological Investigation of Potentially Favorable Areas for Petroleum Exploration in Southeastern Arizona,
W75-04509 2J

ARMY CONSTRUCTION ENGINEERING RESEARCH LAB., CHAMPAIGN, ILL.
A Two-Dimensional Multi-Stage Programming Model: With Application to Reservoir Systems,
W75-04523 4A

ARMY ENGINEER DISTRICT, BALTIMORE, MD.
Flood Plain Information: (Patuxent River) Western Branch (Folly, Lottsford and Vald Hill Br.), Prince Georges County, Maryland.
W75-04754 4A

ARMY ENGINEER DISTRICT, CHICAGO, ILL.
Flood Plain Information: Report on the Des Plaines River, Illinois and Wisconsin.
W75-04746 4A

ARMY ENGINEER DISTRICT, GALVESTON, TEX.
Special Flood Hazard Information: Cypress Creek, Harris County, Texas.
W75-04742 4A

Special Flood Hazard Information: Clear Creek, Brazoria, Fort Bend, Galveston and Harris Counties, Texas.
W75-04743 4A

Flood Plain Information -- Williamson Creek, Austin, Texas.
W75-04747 4A

Flood Plain Information - Cedar Bayou, Houston Metropolitan Area, Texas.
W75-04748 4A

Flood Plain Information -- Goose Creek, Baytown, Texas.
W75-04750 4A

ARMY ENGINEER DISTRICT, JACKSONVILLE, FLA.
Aquatic Plant Control Program, State of Florida (Final Environmental Impact Statement).
W75-04598 5G

ARMY ENGINEER DISTRICT, KANSAS CITY, MO.
Flood Plain Information: Blue River and Tributaries, Johnson County, Kansas.
W75-04744 4A

Flood Plain Information: Big Creek, Chetolah Creek and Lincoln Draw, Hays, Kansas.
W75-04749 4A

Flood Plain Information: Shunganunga Creek, Topeka, Kansas.
W75-04751 4A

ARMY ENGINEER DISTRICT, NEW ORLEANS, LA.
An Ecological Study of a Baldcypress Swamp in St. Charles Parish, Louisiana,
W75-04364 2H

ARMY ENGINEER DISTRICT, NORFOLK, VA.
Flood Plain Information: North Fork Rivanna River, Albemarle County, Virginia.
W75-04745 4A

Flood Plain Information: Mechunk Creek, Albemarle County, Virginia.
W75-04752 4A

Flood Plain Information--Coastal Flooding, City of Chesapeake, Virginia.
W75-04753 4A

ARMY ENGINEER TOPOGRAPHIC LABS., FORT BELVOIR, VA. EARTH SCIENCES DIV.
Hail and Its Distribution,
W75-04604 2C

ASSIUT UNIV. (EGYPT).
River Regime With Special Reference to River Nile,
W75-04706 2E

ASTON UNIV., BIRMINGHAM (ENGLAND).
The use of the Modified Time Series Analysis Technique for The Determination of Areal Precipitation Accuracies,
W75-04683 2B

ATLANTIC RICHFIELD HANFORD CO., RICHLAND, WASH.
Retrievable Surface Storage Facility, Alternative Concepts Engineering Studies.
W75-04401 5D

ATMOSPHERIC ENVIRONMENT SERVICE, CALGARY (ALBERTA).
The Distribution of Precipitation in Some Mountainous Canadian Watersheds,
W75-04671 2B

AUBURN UNIV., ALA. DEPT. OF AGRONOMY AND SOILS.
Irrigation, Row width, and Plant Population in Relation to Growth Characteristics of Two Soybean Varieties,
W75-04369 3F

AUBURN UNIV., ALA. WATER RESOURCES RESEARCH INST.
Planning, Management and Accountability in Water Resources Research,
W75-04439 6B

Will Current Research Answer Today's Problems at the Sanitary Landfill.,
W75-04800 5B

AUTOCON INDUSTRIES, ST. PAUL, MINN.
Computer Control of Chemical Addition at a Water-Treatment Plant,
W75-04535 5F

BATTELLE-PACIFIC NORTHWEST LABS., RICHLAND, WASH.
High-Level Radioactive Waste Management Alternatives.
W75-04402 5D

High-Level Radioactive Waste Management Alternatives - Section 1-3: Summary, Background and Data Base, and Evaluation Methodology.
W75-04403 5D

High-Level Radioactive Waste Management Alternatives - Section 4: Geologic Disposal.
W75-04404 5D

High-Level Radioactive Waste Management Alternatives - Section 5: Ice Sheet Disposal,
W75-04405 5D

High-Level Radioactive Waste Management Alternatives - Section 6: Seabed Disposal,
W75-04406 5D

High-Level Radioactive Waste Management Alternatives - Section 7: Waste Partitioning,
W75-04407 5D

High-Level Radioactivity Waste Management Alternatives - Section 8: Extraterrestrii Disposal,
W75-04408 5D

High-Level Radioactive Waste Management Alternatives - Section 9: Transmutation Processing,
W75-04409 5D

Pacific Northwest Laboratory Annual Report for 1973 to the USAEC Division of Biomedical and Environmental Research Part 4. Physical and Analytical Sciences,
W75-04410 5C

Radiation Instrumentation - Radiological Chemistry,
W75-04411 5A

Nuclear Techniques in Medical Science,
W75-04412 5A

Radiation Physics,
W75-04413 5C

Radiation Dosimetry,
W75-04414 5C

Radiation Biophysics,
W75-04415 5C

Nuclear Powered Prostheses - Biological Effects of Intra-Corporeal Radioisotope Heat Sources,
W75-04416 5C

Medical Uses of Isotopes,
W75-04417 5C

Medical Grade Plutonium-238 From Americium-241,
W75-04418 5C

Recipient Radiation Exposure - Circulatory Support Systems,
W75-04419 5C

Population Radiation Exposure,
W75-04420 5C

Lysimeter Experiment Description and Progress Report on Neutron Measurements,
W75-04725 2D

BELLAIRS RESEARCH INST., ST. JAMES (BARBADOS).
Internal Waves as Causative Mechanisms of Island Mass Effects,
W75-04481 5C

BERGEN UNIV. (NORWAY). GEOFISISK INSTITUTT.
Distribution of Precipitation in the Sognefjord Region,
W75-04665 2B

BOWLING GREEN STATE UNIV., OHIO.
Environmental Requirements and Pollution Tolerance of Freshwater Diatoms,
W75-04563 5C

BRISTOL UNIV. (ENGLAND). DEPT. OF ZOOLOGY.
The Use of Chironomid Pupal Exuviae for Characterizing Streams,
W75-04371 5B

BRITISH METEOROLOGICAL OFFICE, BRACKNELL (ENGLAND).
Orographic Influences on the Distribution of Precipitation,
W75-04676 2B

Areal Rainfall Analysis by Computer,
W75-04687 7C

The Objective Analysis of Relative Humidity,
W75-04791 2B

BUREAU OF LAND MANAGEMENT, WASHINGTON, D. C.
Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale Offshore Mississippi, Alabama, and Florida, Volume 4, (Final Environmental Statement),
W75-04589 5G

Proposed 1973 Outer Continental Shelf Oil and Gas General Lease Sale, Offshore Mississippi, Alabama, and Florida, Volume 5, (Final Environmental Statement),
W75-04590 5G

BUREAU OF RECLAMATION, BOULDER CITY, NEV. REGION 3.
Utilization of the Earth's Natural Heating System to Desalt Geothermal Brines for Augmentation of the Colorado River System,
W75-04430 3A

BUREAU OF RECLAMATION, WASHINGTON, D.C.
The Role of Water and Land Resources in Alleviating Malnutrition and Hunger in Arid Regions,
W75-04603 6B

Procedural Methods for Implementing Colorado River Water Conservation Measures.
W75-04778 6E

BURNS AND ROE, INC., ORADELL, N.J.
Universal Design of a 2.5 MGD Universal Desalting Plant, Revised: Volume 1.
W75-04850 3A

CALIFORNIA UNIV., BERKELEY. LAWRENCE BERKELEY LAB.
Supersonic Aircraft and the Ozone Layer,
W75-04393 5A

On the Vulnerability of Ecosystems Disturbed by Man,
W75-04521 5C

CALIFORNIA UNIV., BERKELEY. SANITARY ENGINEERING RESEARCH LAB.
Biodegradability of a Carboxymethyloxysuccinate Detergent Builder,
W75-04426 5D

Changing from Dumping to Recycling. Part 2. Organic Wastes,
W75-04642 5D

CALIFORNIA UNIV., DAVIS.
Comparative Changes in Soil-Physical Properties Induced by Admixtures of Manures from Various Domestic Animals,
W75-04602 2G

The Combined Effects of Infiltration and Redistribution on Leaching,
W75-04606 2G

CALIFORNIA UNIV., DAVIS. DEPT. OF WATER SCIENCE AND ENGINEERING.
Prediction of Drainage Requirements -- Buyuk Menderes River Basin, Turkey,
W75-04534 4A

CALIFORNIA UNIV., DAVIS. DIV. OF ENVIRONMENTAL STUDIES.
Environmental Values and Water Quality Planning,
W75-04530 5G

CALIFORNIA UNIV., LIVERMORE. LAWRENCE LIVERMORE LAB.
Method for the Construction of Three-Dimensional Electron Micrographs,
W75-04394 5A

Development of an Air Pollution Model for the San Francisco Bay Area. Third Semi annual Report to the National Science Foundation.
W75-04421 5A

CALIFORNIA UNIV., LOS ANGELES.
Distribution of Different Forms of Nitrogen in Some Desert Soils,
W75-04373 2G

Solution of Simultaneous Partial Differential Equations: An Extension of PDEL,
W75-04539 6A

Parameter Identification in Distributed Systems Using a Digital Simulation Language: An Extension of PDEL,
W75-04540 6A

CALIFORNIA UNIV., LOS ANGELES. LAB OF NUCLEAR MEDICINE AND RADIATION BIOLOGY.
Phenological Events and Their Environmental Triggers in Mojave Desert Ecosystems,
W75-04385 2I

CEDERGREN/KOA, LONG BEACH, CALIF.
Development of Guidelines for the Design of Subsurface Drainage Systems for Highway Pavement Structural Sections,
W75-04809 8A

CENTRAL WATER AND POWER RESEARCH STATION, POONA (INDIA).
Study of Orographic Effect on Optimum Number of Raingauges,
W75-04681 7A

CENTRE D'OCEANOGRAPHIE, MARSEILLE (FRANCE). STATION MARINE D'ENDOUME.
Influence of Freshwater Dulution on Dynamics of Populations of Builder Crustaceans from Lagoon of Biguglia, Corsica (Corophium Insidiosum C., Tanais Cavolinii M.E., Erichthonius Brasiliensis D.), (In French),
W75-04490 2H

CENTRO DE ENERGIA NUCLEAR NA AGRICULTURA, SAO PAULO (BRAZIL).
Relative Rates of Flow of the Negro and Solimoes Rivers (Determined) Through O18 Concentrations, (In Porteguese),
W75-04495 2E

CH2O, INC., LA GRANDE, DREG. (ASSIGNEE).
Winch-Driven Irrigation Apparatus,
W75-04452 3F

CHICAGO UNIV., ILL. DEPT. OF THE GEOPHYSICAL SCIENCES.
Particulate Matter at the Sediment-Water Interface in Coastal Environments,
W75-04497 2L

CLAYTON JUNIOR COLL., MORROW, GA.
A New Technique for the Study of Epiphytic Algae,
W75-04499 5C

CLEMSON UNIV., S. C.
A systems Analysis of Water Quality Survey Design,
W75-04522 5B

CLEMSON UNIV., S. C. DEPT. OF AGGRICULTURAL ENGINEERING.
Correlation of Hydrologic Model Parameters with Changing Land Use as Determined from Aerial Photographs,
W75-04448 4C

CLEMSON UNIV., S. C. DEPT. OF MICROBIOLOGY.
Biologic Detection and Control of Water Pollution,
W75-04447 5C

CLIFFSIDE PIPELAYERS, SCARBOROUGH (ONTARIO).
Updating Aging Sewers Without Trenching,
W75-04828 5D

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF AGRICULTURAL ENGINEERING.
Development of an Organic Waste Slurry Injector,
W75-04616 5D

Routine Surveillance Alternatives for Water Quality Management,
W75-04803 5A

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF CIVIL ENGINEERING.
Control Strategy Development Study, San Francisco Wastewater Master Plan,
W75-04352 5D

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF CIVIL ENGINEERING; AND COLORADO STATE UNIV., FORT COLLINS. DEPT. OF ATMOSPHERIC SCIENCE.
An Assessment of Warm Fog - Nucleation, Control, and Recommended Research,
W75-04717 2B

COLORADO STATE UNIV., FORT COLLINS. DEPT. OF MICROBIOLOGY.
Analyzing Biological Properties of Wastes,
W75-04842 5A

COLORADO UNIV., BOULDER. DEPT. OF ECONOMICS.
Effects of Agricultural Acreage Reduction on Water Availability and Salinity in the Upper Colorado River Basin,
W75-04368 6B

COMMISSARIAT A L'ENERGIE ATOMIQUE, FONTENAY-AUX-ROSES (FRANCE). SERVICE DE RECHERCHES TOXICOLOGIQUES ET ECOLOGIQUES.
The Effect of Salinity and Ionic Equilibrium on Contamination of Arenicola Marina L. (Annelida: Polychaeta) by Cesium-137, (In French),
W75-04489 5C

COMMITTEE ON GOVERNMENT OPERATIONS (U.S. HOUSE).
Control of Pollution from Animal Feedlots and Reuse of Animal Wastes,
W75-04615 5D

COMMITTEE ON INTERIOR AND INSULAR AFFAIRS (U. S. HOUSE).
Authorizing the Secretary of the Interior to Construct, Operate, and Maintain the East Greenacres Unit, Rathdrum Prairie Project, Idaho, and for Other Purposes.
W75-04787 6E

COMMITTEE ON INTERIOR AND INSULAR AFFAIRS (U.S. SENATE).
Amending the Act of July 4, 1955, as Amended, Relating to the Construction of Irrigation Distribution Systems.
W75-04597 6E

COMMITTEE ON MERCHANT MARINE AND FISHERIES (U.S. HOUSE).
Authorization for Secretary of Interior to Acquire Additional Wetlands.
W75-04651 6E

Interim Nuclear Licensing.
W75-04788 6E

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, CANBERRA (AUSTRALIA). DIV. OF ENVIRONMENTAL MECHANICS.
The Effect of Initial Moisture Content and Infiltration Quantity of Redistribution of Soil Water,
W75-04517 2G

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, GLEN OSMAND (AUSTRALIA). DIV. OF SOILS.
Silicon Content of Wheat Husks in Relation to Water Transpired,
W75-04484 2D

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, GLEN OSMOND (AUSTRALIA). DIV. OF SOILS.
Micromorphology. A Discipline at the Chemistry-Minerology Interface,
W75-04608 2G

CONNECTICUT AGRICULTURAL EXPERIMENT STATION, NEW HAVEN.
Two-Dimensional Water Infiltration from a Trench in Unsaturated Soils,
W75-04700 2G

CONNECTICUT UNIV., STORRS. DEPT. OF CIVIL ENGINEERING.
Rational Basis for Septic Tank System Design,
W75-04801 5D

CONNECTICUT UNIV., STORRS. DEPT. OF PLANT SCIENCE.
Changes in Transpiration, Net Carbon Dioxide Assimilation and Leaf Water Potential Resulting from Application of Hydrostatic Pressure to Roots of Intact Pepper Plants,
W75-04399 3F

CONSERVATION FOUNDATION, WASHINGTON, D.C.
Rookery Bay: Ecological Constraints on Coastal Development,
W75-04354 5C

CORNELL UNIV., ITHACA, N. Y.
An Economic Analysis of Agricultural Land Use Practices to Control Water Quality,
W75-04526 5G

CORNELL UNIV., ITHACA, N.Y. AGRICULTURAL WASTE MANAGEMENT PROGRAM.
Ammonia Desorption by Diffused Aeration,
W75-04812 5D

CORNELL UNIV., ITHACA, N.Y. DEPT. OF ECOLOGY AND SYSTEMATICS.
Deposition of Water and Cations on Artificial Foliar Collectors in Fir Krummholz of New England Mountains,
W75-04471 2K

CORNELL UNIV., ITHACA, N.Y. DEPT. OF NATURAL RESOURCES.
An Evaluation of State Land Use Planning and Development Control in the Adirondacks,
W75-04445 6E

CORPS OF ENGINEERS, PORTLAND, OREG. NORTH PACIFIC DIV.
Computer Use for River Regulation,
W75-04531 4A

COUNCIL ON ENVIRONMENTAL QUALITY, WASHINGTON, D.C.
Amelioration of Effects of Oil Spills.
W75-04779 5G

CURRAN ASSOCIATES, INC., NORTHAMPTON, MASS.
An Assessment of Wet Systems for Residential Refuse Collection: Summary Report,
W75-04577 5D

DARTMOUTH COLL., HANOVER, N.H. DEPT. OF GEOGRAPHY.
Investigation of Land Use of Northern Megalopolis Using ERTS-1 Imagery,
W75-04726 7C

DECISION SCIENCES CORP., JENKINTOWN, PA.
A Framework for Uncertainty Management in Water Resources Planning,
W75-04519 6B

DEL MONTE CORP., SAN FRANCISCO, CALIF.
Dry Caustic Peeling of Clingstone Peaches on a Commercial Scale,
W75-04564 5D

DELAWARE RIVER BASIN COMMISSION, TRENTON, N.J.
Water Quality Control--The Role of the Interstate Agency,
W75-04596 5G

DEPARTMENT OF AGRICULTURE, SWIFT CURRENT (SASKATCHEWAN). RESEARCH STATION.
Effects of Fertilizer and Available Moisture on the Yield and N and P Content of Wheat and on Soil Nutrients,
W75-04628 3F

DEPT. OF POULTRY HUSBANDRY. CALIFORNIA UNIV., DAVIS.
Sewage-Grown Algae as a Feedstuff for Chicks,
W75-04618 5D

DESERT RESEARCH INST., NEVADA UNIV., RENO.
Numerical Simulation of Unsteady Flow Hydraulics of Truckee River,
W75-04444 6A

DEUTSCHER WETTERDIENST, HOHENPEISSENBERG (WEST GERMANY). METEOROLOGISCHES OBSERVATORIUM.
Area Precipitation Measurement with X-Band Radar from a Mountain North of the Alps,
W75-04691 7B

DIAMOND SHAMROCK CORP., CLEVELAND, OHIO. (ASSIGNEE).
Method for Electrosanitizing Waste Water,
W75-04464 5D

DIRECTORATE OF LICENSING (AEC), WASHINGTON, D.C.
Final Environmental Statement Related to the Proposed Clinton Power Station Units 1 and 2, Illinois Power Company.
W75-04395 5G

Final Environmental Statement Related to Construction of River Bend Nuclear Power Station, Units 1 and 2, Gulf States Utilities Company.
W75-04396 5G

Final Environmental Statement Related to the Proposed Pilgrim Nuclear Power Station Unit 2 Boston Edison Company.
W75-04397 5G

DREXEL UNIV., PHILADELPHIA, PA.
Design and Application of a Multipurpose Management Information System for Drinking Water Quality Assessment in Distribution Systems,
W75-04505 5G

DULUTH, MINN. NATIONAL WATER QUALITY LAB.
Asbestiform Amphibole Minerals: Detection and Measurement of High Concentrations in Municipal Water Supplies,
W75-04818 5A

DURHAM UNIV. (ENGLAND).
Stabilization of Aeolian Lands in Saudi Arabia's Al Hasa Oasis,
W75-04512 3C

ECONOMIC RESEARCH SERVICE, EAST LANSING, MICH. NATURAL RESOURCE ECONOMICS DIV.
Differences Between Planned and Actual Costs and Benefits in Small Watershed Development,
W75-04433 4D

EDAW, INC., SAN FRANCISCO, CALIF.
Surface Water Data of the Llano Texas Region, Project Sanguine.
W75-04847 2E

EIDGENOESSISCHE TECHNISCHE HOCHSCHULE, ZURICH (SWITZERLAND). VERSUCHSANSTALT FUER WASSERBAU, HYDROLOGIE UND GLAZIOLOGIE.
Precipitation Measurements by Means of Storage Gauges with Stereo and Horizontal Orifices in the Baye De Montreux Watershed,
W75-04656 7B

Evaporation Losses from Storage Gauges,
W75-04657 7B

ENCIBRA SOUTH AMERICA, SAO PAULO (BRAZIL).
Simplified Application of Palmer-Bowlus Flow Meters,
W75-04802 8B

ENVIRONMENTAL LAW INST., WASHINGTON, D. C.
Used Oil Law in the United States and Europe,
W75-04575 5G

Economic Disincentives for Pollution Control: Legal, Political, and Administrative Disincentives,
W75-04576 5G

ENVIRONMENTAL PROTECTION AGENCY, ATHENS, GA. SOUTHEAST ENVIRONMENTAL RESEARCH LAB.
Mercury in Aquatic Systems: Methylation, Oxidation-Reduction, and Bioaccumulation,
W75-04570 5B

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D. C.
Complying with Discharge Regulations,
W75-04431 5G

International Environmental Bibliographies--Environmental Legislation--North America.
W75-04594 6G

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D.C. OFFICE OF TECHNICAL ANALYSIS.
Abundance, Diversity and Seasonal Patterns of Estuarine Fish Populations,
W75-04485 5C

ENVIRONMENTAL TECHNICAL APPLICATIONS CENTER, WASHINGTON, D.C.
Atmospheric Moisture Parameterization,
W75-04724 2B

FEDERAL INST. OF HYDROMETEOROLOGY, BELGRADE (YUGOSLAVIA).
The Characteristic Changes of the Amount of Precipitation in Connection with Altitude in the Mountainous Areas of Yugoslavia,
W75-04673 2B

FISHERIES AND MARINE SERVICE, WEST VANCOUVER (BRITISH COLUMBIA). PACIFIC ENVIRONMENT INST.
Fluoride Concentrations in Two Pacific Coast Inlets-An Indication of Industrial Contamination,
W75-04473 5B

FOREST SERVICE (USDA), BERKELEY, CALIF. PACIFIC SOUTHWEST FOREST AND RANGE EXPERIMENT STATION.
Water Yield as an Index of Lee and Windward Topographic Effects on Precipitation,
W75-04678 2B

FOREST SERVICE (USDA), DURHAM, N.H. NORTHEASTERN FOREST EXPERIMENT STATION.
Fascicle Density and Needle Growth Responses of Red Pine to Water Supply Over Two Seasons,
W75-04424 2I

FOREST SERVICE (USDA), FLAGSTAFF, ARIZ. ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION.
Response of Herbaceous Vegetation to Felling of Alligator Juniper,
W75-04376 2I

FOREST SERVICE (USDA), MOSCOW, IDAHO. INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION.
Improved Instrumentation for Measuring Melted Precipitation on Windswept Topography,
W75-04655 7B

FOREST SERVICE (USDA), PORT COLLINS, COLO. ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION.
Management of Phreatophyte and Riparian Vegetation for Maximum Multiple Use Values,
W75-04379 3B

FOREST SERVICE (USDA), TEMPE, ARIZ. FOREST HYDROLOGY LAB.
Energy Budget Measurements Over Three Cover Types in Eastern Arizona,
W75-04383 2I

FOREST SERVICE (USDA), UTAH. FOREST SCIENCES LAB.
Some Intra-Storm Characteristics of High-Intensity Rainfall Bursts,
W75-04689 2B

FREEMAN (WILLIAM F.) ASSOCIATES, HIGH POINT, N.C.
Comprehensive Water and Sewer Plan for Alamance County, North Carolina,
W75-04765 5D

FRIED-KRUPP G.M.B.H., ESSEN (WEST GERMANY). (ASSIGNEE)
Method and Apparatus for Producing a Distillate,
W75-04465 3A

GENERAL DYNAMICS CORP., GROTON, CONN. ELECTRIC BOAT DIV.
An Experimental Study of the Free Surface Effect on a Buoyant Jet,
W75-04559 8B

GEORGIA DEPT. OF NATURAL RESOURCES, ATLANTA.
Oxygen Sag and Stream Purification, (Literature Review),
W75-04849 5B

GEORGIA INST. OF TECH., ATLANTA, GA. ENVRIONMENTAL RESOURCES CENTER.
Economics, (Literature Review),
W75-04846 5G

GEORGIA UNIV., ATHENS. AGRICULTURAL ENGINEERING CENTER.
Settling Basin Design for Raceway Fish Production Systems,
W75-04646 5D

GEORGIA UNIV., ATHENS. SCHOOL OF FOREST RESOURCES.
An Analysis of Forest Water Problems in Georgia,
W75-04356 4D

Study of Subsurface Flow Into Mountain Streams as Related to Topography and Partial (Variable) Source Areas,
W75-04357 4D

The Varying Source Area of Streamflow from Upland Basins,
W75-04358 4D

GIDROMETEOROLOGICHESKII INSTITUT, LENINGRAD (USSR).
Methods for the Study of Laws for the Distribution of Precipitation in Medium-High Mountains (Illustrated by the Vitim River Basin),
W75-04669 2B

GOETTINGEN UNIV. (WEST GERMANY).
Unsteady, Unsaturated, N-Dimensional Moisture Flow in Soil: A Computer Simulation Program,
W75-04701 2G

GOETTINGEN UNIV. (WEST GERMANY). INST. OF SOIL SCIENCE AND FOREST NUTRITION.
Simulation of Moisture Transfer in Soils: One-Dimensional Infiltration,
W75-04695 2G

GOETTINGEN UNIV. (WEST GERMANY). SEDIMENT-PETROGRAPHISCHES INSTITUT.
Controls on the Quality Variations of Some Carbonate Spring Waters,
W75-04710 2F

GRACE W. R. AND CO., NEW YORK, (ASSIGNEE).
Methods for Elimination of Oil Slicks,
W75-04455 5G

Closed-Loop Ozone Generating and Contacting System,
W75-04461 5D

GRACE (W.R.) AUSTRALIA LTD., MELBOURNE. DAVIDSON CHEMICALS DIV.
Solid Adsorbents for Gas and Liquid Treatment,
W75-04826 5D

GREAT LAKES FORESTRY RESEARCH CENTER, SAULT SAINTE MARIE (ONTARIO).
Relative Influence of Moisture-Aeration and Nutrients on Vegetation and Black Spruce Growth in Northern Ontario,
W75-04837 2I

GUELPH UNIV., (ONTARIO). DEPT. OF LAND RESOURCE SCIENCE.
A Leak-Proof Sampling Port in Gas Analyses Studies,
W75-04697 7B

HARNISH AND LOOKUP, ASSOCIATES, NEWARK, N.Y.
Wastewater analysis and its Relation to Company Profits,
W75-04817 5A

HARVARD UNIV., CAMBRIDGE, MASS. BIOLOGICAL LABS.
Acid-Iron Waste as a Factor Affecting the Distribution and Abundance of Zooplankton in the New York Bight: II. Spatial Variations in the Field and Implications for Monitoring Studies,
W75-04574 5B

HAWAII INST. OF GEOPHYSICS, HONOLULU.
Radiocarbon, Carbon-13 and Tritium in Water Samples from Basaltic Aquifers and Carbonate Aquifers on the Island of Oahu, Hawaii,
W75-04441 2F

HAWAII UNIV., HONOLULU. WATER RESOURCES RESEARCH CENTER.
Some Characteristics of Hawaiian High-Intensity Rainfall,
W75-04442 2B

HINDUSTAN CONSTRUCTION COL. LTD., BOMBAY (INDIA).
Adoption of Network Techniques in the Planning and Execution of Irrigation and Power Projects,
W75-04533 3F

HOWARD UNIV., WASHINGTON, D.C. DEPT. OF CIVIL ENGINEERING.
Synthesis of Hydrograph Recessions Adjusted for Evapotranspiration Losses,
W75-04712 2E

HYDROBIOLOGISCH INSTITUTT, NIEUWERSLUIS (NETHERLANDS).
Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. I. Field Observations,
W75-04469 5C

Interrelations Between Sulfate-Reducing and Methane-Producing Bacteria in Bottom Deposits of a Fresh-Water Lake. II. Inhibition Experiments,
W75-04470 5C

HYDROMETEOROLOGICAL INST. OF CROATIA, ZAGREB (YUGOSLAVIA).
A Possibility of Airflow - Precipitation Regime Investigations,
W75-04660 2B

Maximum Daily Precipitation in Gorski Kotar and Lika (Yugoslavia) in Relation to the Overflying Air-Stream,
W75-04666 2B

HYDROMETEOROLOGICAL SERVICE OF THE USSR, MOSCOW.
Analysis of Snow Cover Distribution from Aerophotography Data Over Experimental Mountain Basin of Varzob River,
W75-04658 7B

Snow Survey and Methods for Snow Storage Estimation in Mountain River Basins of the Soviet Union,
W75-04659 2C

About Vertical Gradients of Liquid Precipitation in Mountains,
W75-04668 2B

ICHTHYOLOGICAL ASSOCIATES, INC., MIDDLETOWN, DEL.
The Effect of Temperature and Chemical Pollutants on the Behavior of Several Esturine Organisms,
W75-04353 5C

ILLINOIS STATE WATER SURVEY, URBANA.
Inadvertent Rain Modification as Indicated by Surface Raincells,
W75-04703 2B

Groundwater Pumpage in Northern Illinois, 1960-1970,
W75-04727 4B

ILLINOIS UNIV., URBANA. DEPT. OF AGRICULTURAL ENGINEERING.
In-The-Building Oxidation Ditches for Livestock Wastes,
W75-04643 5D

ILLINOIS UNIV., URBANA. DEPT. OF BOTANY.
Nitrogen Fixation (Acetylene Reduction) by Phytoplankton in Green Bay, Lake Michigan, in Relation to Nutrient Concentrations,
W75-04498 5C

ILLINOIS UNIV., URBANA. DEPT. OF FORESTRY.
Dominance of California Annual Grasslands by Brassica Nigra,
W75-04435 2I

IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND). DEPT. OF CIVIL ENGINEERING.
A Hydrological Assessment of Precipitation in the Western Highlands of New Guinea,
W75-04690 2B

INSTITUT ZA OCEANOGRAFIJU I RIBARSTVO, SPLIT (YUGOSLAVIA).
Contact (Oil) Water Determination in Terrestrial-Waters Using an Oceanographic Method,
W75-04502 5A

INSTITUTE FOR AGRICULTURAL RESEARCH, ZARIA(NIGERIA).
Pattern of Water Availability and Water Requirement for Grain Sorghum Production at Samaru, Nigeria,
W75-04384 3F

INSTITUTE FOR ATMOSPHERIC PHYSICS, BUDAPEST (HUNGARY).
Sensitivity Distribution Along the Strips of Compensation Pyrheliometers,
W75-04796 7B

INSTITUTE FOR THE STUDY OF HEALTH AND SOCIETY, WASHINGTON, D.C.
Engineering a Victory for the Environment: A Citizen's Guide to the U.S. Army Corps of Engineers,
W75-04755 6G

INSTITUTE FOR WATER RESOURCES (ARMY), ALEXANDRIA, VA.
A Regional Model of the Future Demand For Transportation: The Case of Barge Transportation,
W75-04520 6A

INSTITUTE OF ECOLOGY, MADISON, WIS.
Directory of Environmental Life Scientists,
W75-04468 6G

INSTITUTE OF ECONOMIC GROWTH, DELHI (INDIA).
Demand for Irrigation: A Case Study of Government Tube-Wells in Uttar Pradesh,
W75-04529 6D

INSTITUTE OF FOOD TECHNOLOGISTS, CHICAGO, ILL. EXPERT PANEL ON FOOD SAFETY AND NUTRITION.
Mercury in Food: A Scientific Status Summary by the Institute of Food Technologists' Expert Panel on Food Safety and Nutrition,
W75-04579 5C

INSTITUTE OF GAS TECHNOLOGY, CHICAGO, ILL. (ASSIGNEE)
Hydrate Forming in Water Desalination,
W75-04466 3A

INSTITUTE OF HYDROLOGY, WALLINGFORD (ENGLAND).
Estimating Areal Rainfall by Fitting Surfaces to Irregularly Spaced Data,
W75-04693 7C

INTERNATIONAL INST. FOR LAND RECLAMATION AND IMPROVEMENT, WAGENINGEN (NETHERLANDS).
The Rising Water Table in the West Nubarya Area of Egypt,
W75-04363 4B

INTERNATIONAL INST. OF TROPICAL AGRICULTURE, IBADAN (NIGERIA).
The Effect of Soil Texture and Density on the Neutron and Density Probe Calibration for Some Tropical Soils,
W75-04549 2G

INTERNATIONAL JOINT COMMISSION-UNITED STATES AND CANADA. GREAT LAKES LEVELS BOARD.
Regulation of Great Lakes Water Levels--Appendix E--Commercial Navigation.
W75-04601 2H

IOWA STATE UNIV., AMES.
Granular Filters for Tertiary Wastewater Treatment,
W75-04429 5D

A Prototype System to Renovate and Recycle Swine Wastes Hydraulically,
W75-04542 5D

Test Swine Waste Disposal Systems,
W75-04637 5D

IOWA STATE UNIV., AMES. DEPT. OF CIVIL ENGINEERING.
Trickling Filtration of a Waste Containing NTA,
W75-04427 5D

IOWA UNIV., IOWA CITY.
Virological Studies in Water Systems: Natural Occurrence of Reoviruses and Their Inactivation by Physical and Chemical Agents,
W75-04821 5F

KANSAS STATE UNIV., MANHATTAN. DEPT. OF AGRICULTURAL ENGINEERING.
Use of Leaf Resistance for Predicting Irrigation Scheduling,
W75-04351 3F

KANSAS WATER RESOURCES RESEARCH INST., MANHATTAN.
Characteristics and Soil Treatment of Biologically Treated Swine Wastes, Vol. I, CH.1 Thru 3,
W75-04623 5D

Characteristics and Soil Treatment of Biologically Treated Swine Waste, Vol II, Ch. 4, Thru 7,
W75-04624 5D

KARLOVA UNIVERSITA, PRAGUE (CZECHOSLOVAKIA). LAB. OF ICHTHYLOGY.
Note on Growth of the Bream, Abramis Brama (Linnaeus, 1758) in the Orlik Valley Water Reservoir,
W75-04493 2I

KRAMER, CHIN AND MAYO, SEATTLE, WASH.
Fluidized-Bed Sludge Incinerator Design,
W75-04428 5D

LAMONT-DOHERTY GEOLOGICAL OBSERVATORY, PALISADES, N.Y.
Temperature Measurements and Internal Waves in Senaca Lake, New York,
W75-04400 2H

LAS VIRGENES MUNICIPAL WATER DISTRICT, CALABASAS, CALIF.
Tertiary Treatment: The Wrong Solution to a Non-Problem,
W75-04811 5D

LINGUISTIC SYSTEMS, INC., CAMBRIDGE, MASS.
Automation of the Collection and Analysis of Scientific Information in the Problem of the Interaction of the Atmosphere and Ocean,
W75-04729 2B

LITTLE (ARTHUR D.), INC., CAMBRIDGE, MASS.
Manual for Deicing Chemicals: Application Practices,
W75-04567 5G

Manual for Deicing Chemicals: Storage and Handling,
W75-04568 5G

LIVERPOOL UNIV., PORT ERIN (ENGLAND). DEPT. OF MARINE BIOLOGY.
Production Ecology of Two Caribean Marine Ecosystems: I. Physical Environment and Fauna,
W75-04479 5C

Production Ecology of Two Caribbean Marine Ecosystems: II. Metabolism and Energy Flow,
W75-04480 5C

LOS ALAMOS SCIENTIFIC LAB., N. MEX.
Dose-Rate Effect on Life Shortening in Mice,
W75-04398 5C

MANITOBA UNIV., WINNIPEG. DEPT. OF CIVIL ENGINEERING.
Hydraulic Analysis of Winnipeg Sump Inlets,
W75-04804 5D

MARYLAND UNIV., COLLEGE PARK. WATER RESOURCES RESEARCH CENTER.
Tenth Annual Report, Program Activities, July 1, 1973 - June 30, 1974.
W75-04654 9D

MASSACHUSETTS INST. OF TECH., CAMBRIDGE.
Channel Flow Driven by a Stationary Thermal Source,
W75-04793 8B

MELBOURNE AND METROPOLITAN BOARD OF WORKS, (AUSTRALIA).
Living City, (Melbourne, Australia, Review of Operations, 1972-73).
W75-04762 3D

META SYSTEMS, INC., CAMBRIDGE, MASS.
An Operational Framework for Coastal Zone Management Planning.
W75-04558 6A

An Evaluation of Marketable Effluent Permit Systems,
W75-04571 5G

METEOROLOGICAL RESEARCH INST., TOKYO (JAPAN).
Frequent Occurrence of Heavy Rainfall Along the North Side to the Low-Level Jet Stream in the Baiu Season,
W75-04704 2B

METROPOLITAN TORONTO AND REGION CONSERVATION AUTHORITY, WOODBRIDGE (ONTARIO).
A Compendium of Information, (The Metropolitan Toronto and Region Conservation Authority).
W75-04760 3D

MICHIGAN STATE GEOLOGICAL SURVEY, LANSING.
Sampling of Variable, Waste-Migration Patterns in Ground Water,
W75-04799 5B

MIDDLE EAST TECHNICAL UNIV., ANKARA (TURKEY). DEPT. OF CHEMISTRY.
Solubility Studies of Metallic Mercury in Pure Water at Various Temperatures,
W75-04815 5A

MIDWEST RESEARCH INST., KANSAS CITY, MO.
Nonpoint Agricultural Pollution: Status of Assessment Methodology,
W75-04645 5B

MINNESOTA UNIV., MINNEAPOLIS. ST. ANTHONY FALLS HYDRAULIC LAB.
Temperature Dynamics in Dimictic Lakes,
W75-04705 2H

MINNESOTA UNIV., MORRIS.
Surface Water Quality is Influenced by Agricultural Practices,
W75-04548 5B

MISSISSIPPI UNIV., UNIVERSITY. SCHOOL OF LAW.
A Survey of Federal and Mississippi Environmental Law with an Examination of its effect on Land Development,
W75-04845 6G

MISSOURI UNIV., COLUMBIA.
Philosophy on Livestock Waste Regulation,
W75-04838 5G

MISSOURI UNIV., COLUMBIA. DEPT. OF AGRICULTURAL ENGINEERING.
Micrometeorological Measurements for Pesticide Drift Studies,
W75-04714 5B

MISSOURI UNIV., ROLLA. DEPT. OF MECHANICAL AND AEROSPACE ENGINEERING.
Diurnal Temperature Distribution in Small Reservoir,
W75-04443 2H

MONTANA STATE UNIV., BOZEMAN. DEPT. OF PLANT AND SOIL SCIENCE.
Suspended Solids Carried by the Gallatin River of Southwestern Montana: Amounts Carried During Spring Runoff,
W75-04501 2J

MONTANA STATE UNIVERSITY, BOZEMAN. DEPT. OF EARTH SCIENCES.
Atmospheric Water Resources Management Program - Bridger Range Cloud Seeding Experiment,
W75-04721 3B

NATAL UNIV., DURBAN(SOUTH AFRICA).
Expectation and Dispersion Matrices for the Estimation of Distributions Associated with Discrete Reservoirs,
W75-04525 4A

NATIONAL ENVIRONMENTAL RESEARCH CENTER, CINCINNATI, OHIO.
1971 Annual Review of Literature. Waste Water Treatment Physical and Chemical Methods,
W75-04437 5D

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, PRINCETON, N.J. GEOPHYSICAL FLUID DYNAMICS LAB.
Simple Albedo Feedback Models of the Icecaps,
W75-04794 2C

NATIONAL WATER QUALITY LAB., DULUTH, MINN.
Effects of Pollution on Freshwater Fish, (Literature Review),
W75-04848 5C

NATIONAL WEATHER SERVICE, SILVER SPRING, MD. OFFICE OF HYDROLOGY.
Relation of Orographic Winter Precipitation Patterns to Meteorological Parameters,
W75-04670 2

Physiographically Adjusted Precipitation-Frequency Maps,
W75-04672 2B

Extreme Thunderstorm Rainfall in the Intermountain Western United States,
W75-04677 2B

NAVAL ORDNANCE LAB., WHITE OAK, MD.
Determination of the Molecular Solubility of Navy Oils in Water,
W75-04722 5A

NAVAL POSTGRADUATE SCHOOL, MONTEREY, CALIF.
An Examination of Alternative Methods for Employing Booms to Contain Oil Spills in Navy Harbors,
W75-04720 5G

NAVAL RESEARCH LAB., WASHINGTON, D.C. OCEAN SCIENCES DIV.
Determination of the Thickness of Petroleum Films on Water,
W75-04723 5A

NEBRASKA UNIV., LINCOLN. AGRICULTURAL EXPERMENT STATION.
The Design of a Livestock Water Distribution System--Large Scale,
W75-04527 3F

NEBRASKA UNIV., LINCOLN. DEPT. OF CIVIL ENGINEERING.
Laboratory Studies on Feedlot Runoff,
W75-04653 5D

NELSON (B.L.) AND ASSOCIATES, INC., DALLAS, TEX.
Comprehensive Plan for Water, Sewer and Storm Drainage in the Lower Rio Grande Valley, (Volume II).
W75-04759 5D

NEW JERSEY AGRICULTURAL EXPERIMENT STATION, NEW BRUNSWICK.
Farms are Not in the Country Any More,
W75-04546 5D

NEW MEXICO STATE UNIV., UNIVERSITY PARK. DEPT. OF BIOLOGY.
The Influence of Soil Water Potential on the Perennial Vegetation of a Desert Arroyo,
W75-04365 2I

NEW YORK CITY DEPT. OF WATER RESOURCES. INDUSTRIAL WASTES CONTROL SECTION.
Sources of Metals in New York City Wastewater,
W75-04805 5B

NEW YORK STATE COLL. OF AGRICULTURE AND LIFE SCIENCES, ITHACA, N.Y. DEPT. OF AGRICULTURAL ECONOMICS.
Economic and Environmental Considerations in Dairy Manure Management Systems,
W75-04543 5D

NIPPON PRECISION OPTICAL INSTRUMENT, CO. LTD., TOKOYO (JAPAN).
Sphere Method Turbidimeter,
W75-04819 5A

NORWEGIAN WATER RESOURCES AND ELECTRICITY BOARD, OSLO (NORWAY).
Deficiencies in Measured Snow Precipitation in a Mountainous Area in Norway,
W75-04684 2C

OCCIDENTAL PETROLEUM CORP., LOS ANGELES, CALIF. (ASSIGNEE).
Removal of Boron From Water,
W75-04462 5D

OFFICE OF WATER RESEARCH AND TECHNOLOGY, WASHINGTON, D.C.
Acid Mine Water, A Bibliography,
W75-04625 5G

OHIO STATE UNIV., COLUMBUS.
Coprology: A Pollution Solution,
W75-04545 5D

OKLAHOMA STATE UNIV., STILLWATER. DEPT. OF AGRICULTURAL ENGINEERING.
Effect of Feedlot Laws and Climate on Open Feedlot Waste Management,
W75-04630 5D

OKLAHOMA UNIV., NORMAN. SCHOOL OF CIVIL ENGINEERING AND ENVIRONMENTAL SCIENCE.
Organic Compounds Entering Ground Water from a Landfill,
W75-04573 5B

OREGON STATE OF ENVIRONMENTAL QUALITY, PORTLAND. WATER QUALITY DIV.
Subsurface Sewage Disposal and Contamination of Ground Water in East Portland, Oregon,
W75-04798 5B

OREGON STATE UNIV., CORVALLIS. DEPT. OF AGRICULTURAL ENGINEERING.
Manure Application Guidelines for the Pacific Northwest,
W75-04631 5G

OSLO UNIV. (NORWAY). DEPT. OF LIMNOLOGY.
Salsvatn, A Lake with Old Sea Water,
W75-04500 2H

OSLO UNIV. (NORWAY). INST. OF GEOPHYSICS.
Computation of Air Flow Over Mountains in Statically Stable Situations,
W75-04663 2B

Orographic Influences on Distribution of Precipitation,
W75-04664 2B

OXFORD UNIV. (ENGLAND). DEPT. OF AGRICULTURAL SCIENCE.
Characteristics of Precipitation in the Scottish Highlands,
W75-04661 2B

PACIFIC NORTHWEST ENVIRONMENTAL RESEARCH LAB., CORVALLIS, OREG.
Water Recycle/Reuse Possibilities: Power Plant Boiler and Cooling Systems,
W75-04566 5D

PAKISTAN METEOROLOGICAL DEPT., KARACHI.
Distribution of Precipitation in Mountainous Areas of West Pakistan,
W75-04674 2B

PAPUA AND NEW GUINEA UNIV., PORT MORESBY (NEW GUINEA). DEPT. OF PHYSICS.
Salt and Water Movement in Relatively Dry Soil,
W75-04516 2G

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. DEPT. OF AGRICULTURAL ENGINEERING.
Dewatering Bovine Animal Manure,
W75-04627 5D

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. DEPT. OF CIVIL ENGINEERING.
Bacterial Zoogloea Formation,
W75-04572 5D

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. INST. FOR RESEARCH ON LAND AND WATER RESOURCES.
Identification and Evaluation of Water Tracers Amenable to Post-Sampling Neutron Activation Analysis,
W75-04355 5A

PENNSYLVANIA UNIV., PHILADELPHIA. INST. FOR ENVIRONMENTAL STUDIES.
The Brandywine: Five Years After,
W75-04360 6B

Delaware River Basin Compact: A Review with Respect to Environmental Quality,
W75-04361 6E

Regulation of Urban Development to Control Runoff and Erosion,
W75-04362 4D

PETROLITE CORP., WILMINGTON, DEL. (ASSIGNEE).
Water Clarification with Nitrogen-Heterocyclic Phosphonic Acids,
W75-04457 5D

PNEUMATIQUES, CAOUTCHOUC MANUFACTURE ET PLASTIQUES KLEBER-COLOMBES (FRANCE). (ASSIGNEE)
Inflatable Barriers for Watercourses,
W75-04467 8A

PRESIDENT'S WATER POLLUTION CONTROL ADVISORY BOARD, WASHINGTON, D.C.
The Relationship Between Animal Wastes and Water Quality.
W75-04840 5G

PROCTOR, REDFERN, BOUSFIELD AND BACON, SAINT JOHN (NEW BRUNSWICK).
The Urban Region Plan: Saint John, (New Brunswick), Urban Region Impact Study.
W75-04756 6B

PUNJAB AGRICULTURAL UNIV., LUDHIANA (INDIA).
Stress-Strain Response for Sand,
W75-04696 8D

PUNJAB AGRICULTURAL UNIV., LUDHIANA (INDIA). DEPT. OF SOILS.
Comparison of Banded and Broadcast Fertilizer Applications in Relation to Compaction and Irrigation in Maize and Wheat,
W75-04611 3F

PURDUE UNIV., LAFAYETTE, IND.
Indiana Poultrymen are Composting Poultry Manure,
W75-04552 5D

Turbidity Removal Using Polymers and Activated Carbon,
W75-04820 5F

Applicability of Control Strategies to the Activated Sludge Wastewater Treatment Process,
W75-04822 5D

PURDUE UNIV., LAFAYETTE, IND. DEPT. OF AGRICULTURAL ENGINEERING.
Swine Waste Management Systems,
W75-04629 5D

Tentative Criteria for Design, Construction and Operation of the Batch Type Pasveer Oxidation Ditch System for the Treatment of Animal Wastes,
W75-04636 5D

Irrigation for Land Application of Animal Waste,
W75-04638 5D

RHODE ISLAND UNIV., KINGSTON. DEPT. OF CIVIL AND ENVIRONMENTAL ENGINEERING.
Electrochemical Process for Nutrient Removal,
W75-04446 5D

RICHARD B. RUSSELL AGRICULTURAL RESEARCH CENTER, ATHENS, GA.
A Study of the Waste Wash Water from Egg Washing Machines,
W75-04475 5B

ROBERT S. KERR WATER RESEARCH CENTER, ADA, OKLA.
Methods of Removing Nitrates From Water,
W75-04626 5D

ROFE, KENNARD AND LAPWORTH, LONDON(ENGLAND).
The Design and Promotion of a Scheme Using Mixed Water from the Rivers Ancholme, Witham and Trent for Industrial Supply to Humberside,
W75-04764 3E

ROSENSTIEL SCHOOL OF MARINE AND ATMOSPHERIC SCIENCE, MIAMI, FLA.
Torulopsis Austromarina Sp. Nov. A Yeast Isolated from the Antartic Ocean,
W75-04436 5A

RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N.J.
Lignin Separation by Continuous Ion Flotation: Investigation of Physical Operational Parameters,
W75-04476 5D

RUTGERS - THE STATE UNIV., NEW BRUNSWICK, N.J. INST. OF MICROBIOLOGY.
Microbiological Production of Geosmin,
W75-04561 5D

S.K.N. COLL. OF AGRICULTURE, JOBNER (INDIA). DEPT. OF AGRICULTURAL CHEMISTRY AND SOIL SCIENCE.
Effect of Qualities of Irrigation Water and Fertilizers on Soil Properties, Yield and Nutrient Uptake by Wheat,
W75-04482 3F

SAN BERNADINO COUNTY AGRICULTURAL EXTENSION SERVICE, CALIF.
Subfloor Monitoring of Shady Grove Dairy Liquid Manure Holding Pond,
W75-04640 5D

SAO PAULO UNIV. (BRAZIL). INSTITUTO OCEANOGRAFICO.
The Occurrence of Young Sardinella Aurita in the Brackish Water of the Lagoons of Cananeia (Brazil), (In German),
W75-04492 2L

SARGENT AND LUNDY, CHICAGO, ILL.
An Alternative Formulation of the Problem of Density Jump,
W75-04797 8B

SHELL DEVELOPMENT COMPANY, HOUSTON, TEX. BELLAIRE RESEARCH CENTER.
Chemical and Physical Characterization of Tar Samples from the Marine Environment,
W75-04718 5A

SILVESTON (B AND P), KITCHENER (ONTARIO).
Notes--Workshop on Computer-Aided Design and Simulation of Waste Treatment Systems,
W75-04518 5D

SOCIETE GENERAL D'ENTREPRISES, PARIS (FRANCE). (ASSIGNEE).
Vertical, Multistage-Flash, Falling Film Column for Distilling Brine,
W75-04459 3A

SOCIETE GRENOBLOISE D'ETUDE ET D'APPLICATIONS HYDRAULIQUES (FRANCE).
Evaluation Problem of Storm Water Routing Mathematical Models,
W75-04708 5D

SOCIETE LYONNAISE DES EAUX ET DE L'ECLAIRAGE (FRANCE). LABORATOIRE.
Measurement of Hydrocarbons in Water: Application to Cases of Surface Water Pollution,
W75-04709 5A

SOIL CONSERVATION SERVICE, GRAND RAPIDS, MICH.
Flood Hazard Reports: Tools for Resource Planning and Management,
W75-04432 4A

SOIL CONSERVATION SERVICE, INDIANAPOLIS, IND.
A Method for Determining Peak Flows and Detention Storage Requirements in Urbanizing Areas.
W75-04694 4A

SOIL CONSERVATION SERVICE, PHOENIX, ARIZ.; AND BUREAU OF LAND MANAGEMENT, PHOENIX, ARIZ.
Spy Mesa Yields Better Understanding of Pinyon-Juniper in Range Ecosystem,
W75-04375 2I

SOUTH DAKOTA STATE UNIV., BROOKINGS. WATER RESOURCES INST.
Pierced Steel Planking Surfacing for Feedlot Runoff Control,
W75-04644 5D

SOUTHEASTERN MASSACHUSETTS UNIV., NORTH DARTMOUTH. DEPT. OF CIVIL ENGINEERING.
The Effects of the Interaction of Outboard Motors with the Aquatic Environment: A Review,
W75-04816 5C

SOUTHERN REGIONAL RESEARCH LAB., NEW ORLEANS, LA.; AND ALABAMA AGRICULTURAL EXPERIMENT STATION, AUBURN.
Effect of Root Pruning on Water Relations and Growth of Cotton,
W75-04613 2I

SOUTHWESTERN GREAT PLAINS RESEARCH CENTER, BUSHLAND, TEX.
Feedlot Waste Effects on Soil Conditions and Water Evaporation,
W75-04699 5B

Effects of Cattle Feedlot Manure on Crop Yields and Soil Conditions,
W75-04833 5D

Amounts, Composition, and Management of Feedlot Runoff,
W75-04835 5D

ST. LOUIS METROPOLITAN SEWER DISTRICT, MO.
TV Inspections Slash Sewer Costs $300 per Repair,
W75-04830 5G

STANFORD RESEARCH INST., MENLO PARK, CALIF.
Precipitation Estimates from Meteorological Satellite Data,
W75-04685 2B

STANFORD UNIV., PACIFIC GROVE, CALIF. HOPKINS MARINE STATION.
Comparative Photosynthetic Capacities of Intertidal Algae Under Exposed and Submerged Conditions,
W75-04524 5C

STATE UNIV. OF NEW YORK, ALBANY. ATMOSPHERIC SCIENCES RESEARCH CENTER.
Diurnal Variations in Cloud Condensation Nuclei,
W75-04711 2B

STATE UNIV. OF NEW YORK, BUFFALO. DEPT. OF CIVIL ENGINEERING.
Optimal Operation of Multiple Reservoir System,
W75-04532 4A

SWISS FOREST RESEARCH INST., BIRMENSDORF.
Factors Affecting the Estimate of Areal Average Summer and Winter Precipitation in a Small Catchment of the Swiss Prealps,
W75-04686 2B

SYDNEY UNIV. (AUSTRALIA). DEPT. OF SOIL SCIENCE.
The Temperature Profiles of Soil Columns During Infiltration,
W75-04389 2G

A Nondestructive Method of Following Moisture Content and Temperature Changes in Soils Using Thermistors,
W75-04605 2G

TAYLOR (JOHN) AND SONS (ENGLAND).
Sewage Treatment in the Potteries,
W75-04823 5D

TECHISCHE UNIVERSITAET, BRUNSWICK (WEST GERMANY). LEICHTWEISS INST. FOR WATER RESEARCH.
Computerized Calculation of Areal Precipitation and Its Accuracy,
W75-04688 7C

TECHNION--ISRAEL INST. OF TECH., HAIFA.
Water Management Systems,
W75-04538 3F

TECHNION - ISRAEL INST. OF TECH., HAIFA. SOILS AND FERTILIZERS LAB.
Nitrogen Release Associated with the Decrease in Soil Organic Matter in Newly Cultivated Soils,
W75-04367 5B

TEL AVIV UNIV. (ISRAEL). DEPT. OF ENVIRONMENTAL SCIENCES.
The Coalescence of Water Drops,
W75-04728 1A

TEL-AVIV UNIV. (ISRAEL), DEPT. OF MATHEMATICAL SCIENCES.
Frontal Motion in the Atmosphere,
W75-04792 2B

TEXAS A AND M UNIV., COLLEGE STATION.
The Development of a Mathematical Model to Predict Runoff Water Quality from Watersheds,
W75-04551 5B

Simulation and Statistical Quality Control for Water Pollution Abatement,
W75-04557 5G

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF AGRICULTURAL ENGINEERING.
Susceptibility of Grain Sorghum to Water Deficit at Three Growth Stages,
W75-04483 3F

TEXAS A AND M UNIV., COLLEGE STATION. DEPT. OF BIOLOGY.
The Effects of Mercuric Chloride Upon Respiration in Congeria Leucophaeta,
W75-04472 5C

TEXAS AGRICULTURAL EXTENSION SERVICE, COLLEGE STATION.
Future Developments in Feedlot Waste Management,
W75-04836 5D

TEXAS TECH UNIV. CENTER AT AMARILLO, PANTEX.
Effect of Ration on Manure Salt Content,
W75-04834 5D

TEXAS TECH UNIV., LUBBOCK. DEPT OF RANGE AND WILDLIFE MANAGEMENT.
Wood Boring Insect Infestations in Relation to Mesquite Control Practices,
W75-04380 3B

TEXAS TECH UNIV., LUBBOCK. WATER RESOURCES CENTER.
Nitrogen Mass Balance Determination for Simulated Wastewater Land-Spreading Operations,
W75-04449 5D

THESSALONIKI UNIV., SALONIKA (GREECE).
Environmental Consequences of Land Use in Arid and Semiarid Areas,
W75-04514 6G

TOKYO UNIV. (JAPAN). DEPT. OF PARASITOLOGY.
Studies on the Effectiveness of the Guppy Poecilia Reticulata in Controlling Culex Pipiens S.L.:I. Laboratory Experiments on Predation Behavior, (In Japanese),
W75-04382 5G

TURKU UNIV. (FINLAND). ARCHIPELAGO RESEARCH INST.
Littoral Fish Populations After an Oil Tanker Disaster in the Finnish SW Archipelago,
W75-04487 5C

TURKU UNIV. (FINLAND). DEPT. OF ZOOLOGY.
Vertical Distribution of Freshwater Mussels (Pelecypoda, Unionidae) in Southwestern Finland,
W75-04486 2I

UNION CARBIDE CORP., SOUTH CHARLESTON, W. VA.
Chemicals and Allied Products, (Literature Review),
W75-04474 5G

UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES. DEPT. OF ELECTRICAL ENGINEERING, AND MATERIALS SCIENCE.
Optimal Weighting Function in Water Quality Modeling,
W75-04614 5B

UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES. ENVIRONMENTAL ENGINEERIG PROGRAM.
Trace Metals in Wastewater Effluents,
W75-04806 5B

UPPSALA UNIV. (SWEDEN). DEPT. OF METEOROLOGY.
A Critical Examination of the Turbulence Instrument used in the Marsta Micro-Meteorological Field Project,
W75-04795 7B

UPPSALA UNIV. (SWEDEN). INST. OF ZOOLOGY.
The Effect of Cooling Water Discharges on Zooplankton in a Bay of Lake Malaren,
W75-04496 5C

UPPSALA UNIVERSITY, UPPSALA (SWEDEN), DEPT. OF PHYSICAL GEOGRAPHY.
On the Problem of Vertical Distribution of Precipitation, Especially in Areas with Great Height Differences,
W75-04680 2B

UTAH STATE UNIV., LOGAN.
Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04391 2C

Evaluation of the Filter Paper Method for Estimating Soil Water Potential,
W75-04506 2G

Trickle Irrigation Soil Water Potential as Influenced by Management of Highly Saline Water,
W75-04507 2G

Model for Predicting Plant Yield as Influenced by Water Use,
W75-04609 2I

UTAH STATE UNIV., LOGAN. DEPT. OF PLANT SCIENCE.
Control of Gambel Oak with Three Herbicides,
W75-04366 3B

UTAH STATE UNIV., LOGAN. DEPT. OF RANGE SCIENCE.
Economics of Fertilizer Application on Range and Meadow Sites in Utah,
W75-04388 2I

UTAH WATER RESEARCH LAB., LOGAN.
A Hybrid Computer Simulation Model for Predicting the Effects of the Areal Distribution of Precipitation on Runoff Characteristics,
W75-04692 2B

Planning for Water Quality in the Bear River System in the State of Utah.
W75-04757 5G

VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG. DEPT. OF ECONOMICS.
Enforcement Economics in Air Pollution Control,
W75-04569 5G

VOLCANI INST. OF AGRICULTURAL RESEARCH, BET-DAGAN (ISRAEL). DEPT. OF SOIL PHYSICS.
Water Uptake by Seeds as Affected by Water Stress, Capillary Conductivity, and Seed-Soil Water Contact. I. Experimental Study and, II. Analysis of Experimental Data,
W75-04381 2I

WAITE AGRICULTURAL RESEARCH INST., GLEN OSMOND (AUSTRALIA).
Polyvinyl Alcohol as a Stabilizer of Surface Soil,
W75-04607 2G

WASHINGTON D.C., COMMITTEE ON INTERIOR AND INSULAR AFFAIRS (U. S. SENATE).
Amending the National Environmental Policy Act of 1969, to Provide for a National Environmental Data System.
W75-04785 6E

WASHINGTON STATE UNIV., PULLMAN. DEPT. OF AGRICULTURAL ENGINEERING.
Management of Swine Waste by a Lagoon System,
W75-04632 5D

WATER RESOURCES BULLETIN, VOL 10, NO 5, P 942-951, OCTOBER, 1974. 4 TAB, 6 REF.
Are we Ready for a Closed System of Water Supply, Treatment, and Reuse - Technology vs. Psychology,
W75-04761 5D

WATERLOO UNIV. (ONTARIO). DEPT. OF CHEMICAL ENGINEERING.
Laboratory Study of Continuous Electrooxidation of Dilute Cyanide Wastes,
W75-04719 5D

WHITSTABLE URBAN DISTRICT COUNCIL(ENGLAND).
Design, Construction and Launching of a Submarine Outfall Sewer at Whitstable,
W75-04536 5D

WINDSOR UNIV. (ONTARIO). DEPT. OF CIVIL ENGINEERING.
Bubble Size and Contact Time in Diffused Aeration Systems,
W75-04813 5D

WISCONSIN UNIV., MADISON.
An In-Depth Look at Federal Pollution Controls,
W75-04544 5G

He Solved His Manure Handling Problem,
W75-04634 5D

Water Quality by Photographic Analysis,
W75-04814 5A

WISCONSIN UNIV., MADISON. DEPT. OF CIVIL AND ENVIRONMENTAL ENGINEERING.
Modeling Sewage Treatment Plant Input BOD Data,
W75-04528 5D

Uniform Distribution in Soil Absorption Fields,
W75-04807 5D

WISCONSIN UNIV.-STEVENS POINT.
The Classification of Some Nigerian Soils,
W75-04390 2G

WISCONSION UNIV., MADISON. DEPT. OF GEOLOGY AND GEOPHYSICS.
Nutrient Enrichment of Groundwater from Septic Tank Disposal Systems,
W75-04758 5C

WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS.
Benthic Community Respiration Near the Woods Hole Sewage Outfall,
W75-04503 5C

WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS. DEPT. OF CHEMISTRY.
Petroleum Hydrocarbons in Narragansett Bay: I. Survey of Hydrocarbons in Sediments and Clams (Mercenaria Mercenaria),
W75-04477 5B

Petroleum Hydrocarbons in Narragansett Bay: II. Chemical and Isotopic Analysis,
W75-04478 5B

WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASSACHUSETTS.
Rotating Hydraulics of Strait and Sill Flows,
W75-04716 2L

WYOMING UNIV., LARAMIE.
Application of the Main II Water Forecasting System to Wyoming Communities,
W75-04541 6D

WYOMING UNIV., LARAMIE. WATER RESOURCES RESEARCH INST.
Some Effects of Spring Snowmelt Runoff on Aquatic Invertebrate Populations in a High Moutain Stream,
W75-04450 2I

Y-T-O AND ASSOCIATES, WALNUT CREEK, CALIF.
Surge Facility for Wet and Dry Weather Flow Control,
W75-04562 5D

ZENTRALANSTALT FUER METEOROLOGIE UND GEODYNAMIK, VIENNA (AUSTRIA).
Statistical Considerations About Snow Conditions in the Austrian Alps,
W75-04667 2C

ACCESSION NUMBER INDEX

W75-04351 3F
W75-04352 5D
W75-04353 5C
W75-04354 5C
W75-04355 5A
W75-04356 4D
W75-04357 4D
W75-04358 4D
W75-04359 6B
W75-04360 6B
W75-04361 6E
W75-04362 4D
W75-04363 4B
W75-04364 2H
W75-04365 2I
W75-04366 3B
W75-04367 5B
W75-04368 6B
W75-04369 3F
W75-04370 5G
W75-04371 5B
W75-04372 2B
W75-04373 2G
W75-04374 2G
W75-04375 2I
W75-04376 2I
W75-04377 2G
W75-04378 2I
W75-04379 3B
W75-04380 3B
W75-04381 2I
W75-04382 5G
W75-04383 2I
W75-04384 3F
W75-04385 2I
W75-04386 8I
W75-04387 5C
W75-04388 2I
W75-04389 2G
W75-04390 2G
W75-04391 2C
W75-04392 2G
W75-04393 5A
W75-04394 5A
W75-04395 5G
W75-04396 5G
W75-04397 5G
W75-04398 5C
W75-04399 3F
W75-04400 2H
W75-04401 5D
W75-04402 5D
W75-04403 5D
W75-04404 5D
W75-04405 5D
W75-04406 5D
W75-04407 5D
W75-04408 5D
W75-04409 5D
W75-04410 5C
W75-04411 5A
W75-04412 5A
W75-04413 5C
W75-04414 5C
W75-04415 5C
W75-04416 5C
W75-04417 5C
W75-04418 5C
W75-04419 5C
W75-04420 5C
W75-04421 5A
W75-04422 3A
W75-04423 3A
W75-04424 2I
W75-04425 5G
W75-04426 5D
W75-04427 5D
W75-04428 5D
W75-04429 5D
W75-04430 3A
W75-04431 5G
W75-04432 4A
W75-04433 4D
W75-04434 5F
W75-04435 2I
W75-04436 5A
W75-04437 5D
W75-04438 5B
W75-04439 6B
W75-04440 4A
W75-04441 2F
W75-04442 2B
W75-04443 2H
W75-04444 6A
W75-04445 6E
W75-04446 5D
W75-04447 5C
W75-04448 4C
W75-04449 5D
W75-04450 2I
W75-04451 3A
W75-04452 3F
W75-04453 8A
W75-04454 5D
W75-04455 5G
W75-04456 5D
W75-04457 5D
W75-04458 5D
W75-04459 3A
W75-04460 5D
W75-04461 5D
W75-04462 5D
W75-04463 5D
W75-04464 5D
W75-04465 3A
W75-04466 3A
W75-04467 8A
W75-04468 6G
W75-04469 5C
W75-04470 5C
W75-04471 2K
W75-04472 5C
W75-04473 5B
W75-04474 5G
W75-04475 5B
W75-04476 5D
W75-04477 5B
W75-04478 5B
W75-04479 5C
W75-04480 5C
W75-04481 5C
W75-04482 3F
W75-04483 3F
W75-04484 2D
W75-04485 5C
W75-044b6 2I
W75-04487 5C
W75-04488 2I
W75-04489 5C
W75-04490 2H
W75-04491 5C
W75-04492 2L
W75-04493 2I
W75-04494 2I
W75-04495 2E
W75-04496 5C
W75-04497 2L
W75-04498 5C
W75-04499 5C
W75-04500 2H
W75-04501 2J
W75-04502 5A
W75-04503 5C
W75-04504 5B
W75-04505 5G
W75-04506 2G
W75-04507 2G
W75-04508 3B
W75-04509 2J
W75-04510 5G
W75-04511 2I
W75-04512 3C
W75-04513 2B
W75-04514 6G
W75-04515 2G
W75-04516 2G
W75-04517 2G
W75-04518 5D
W75-04519 6B
W75-04520 6A
W75-04521 5C
W75-04522 5B
W75-04523 4A
W75-04524 5C
W75-04525 4A
W75-04526 5G
W75-04527 3F
W75-04528 5D
W75-04529 6D
W75-04530 5G
W75-04531 4A
W75-04532 4A
W75-04533 3F
W75-04534 4A
W75-04535 5F
W75-04536 5D
W75-04537 3F
W75-04538 3F
W75-04539 6A
W75-04540 6A
W75-04541 6D
W75-04542 5D
W75-04543 5D
W75-04544 5G
W75-04545 5D
W75-04546 5D
W75-04547 5B
W75-04548 5B
W75-04549 2G
W75-04550 5D
W75-04551 5B
W75-04552 5D
W75-04553 5D
W75-04554 5D
W75-04555 5D
W75-04556 5D
W75-04557 5G
W75-04558 6A
W75-04559 8B
W75-04560 5B
W75-04561 5D
W75-04562 5D
W75-04563 5C
W75-04564 5D
W75-04565 5D
W75-04566 5D
W75-04567 5G
W75-04568 5G
W75-04569 5G
W75-04570 5B
W75-04571 5G
W75-04572 5D
W75-04573 5B
W75-04574 5B
W75-04575 5G
W75-04576 5G
W75-04577 5D
W75-04578 5C
W75-04579 5C
W75-04580 6E
W75-04581 5G
W75-04582 6E
W75-04583 2L
W75-04584 5G
W75-04585 5G
W75-04586 5G
W75-04587 5G
W75-04588 6E
W75-04589 5G
W75-04590 5G
W75-04591 5G
W75-04592 5G
W75-04593 5G
W75-04594 6G
W75-04595 5G
W75-04596 5G
W75-04597 6E
W75-04598 5G
W75-04599 6E
W75-04600 6F
W75-04601 2H
W75-04602 2G
W75-04603 6B
W75-04604 2C
W75-04605 2G
W75-04606 2G
W75-04607 2G
W75-04608 2G
W75-04609 2I
W75-04610 3B
W75-04611 3F
W75-04612 2I
W75-04613 2I
W75-04614 5B
W75-04615 5D
W75-04616 5D
W75-04617 5D
W75-04618 5D
W75-04619 5D
W75-04620 5D
W75-04621 5D
W75-04622 5D
W75-04623 5D
W75-04624 5D
W75-04625 5G
W75-04626 5D
W75-04627 5D
W75-04628 3F
W75-04629 5D
W75-04630 5D
W75-04631 5G
W75-04632 5D
W75-04633 5A
W75-04634 5D
W75-04635 5D
W75-04636 5D
W75-04637 5D
W75-04638 5D
W75-04639 5G
W75-04640 5D
W75-04641 5D
W75-04642 5D
W75-04643 5D
W75-04644 5D
W75-04645 5B
W75-04646 5D
W75-04647 7B
W75-04648 6E
W75-04649 6E
W75-04650 6E
W75-04651 6E
W75-04652 6E
W75-04653 5D
W75-04654 9D
W75-04655 7B
W75-04656 7B
W75-04657 7B
W75-04658 7B
W75-04659 2C
W75-04660 2B
W75-04661 2B
W75-04662 2B

W75-04663	2B
W75-04664	2B
W75-04665	2B
W75-04666	2B
W75-04667	2C
W75-04668	2B
W75-04669	2B
W75-04670	2
W75-04671	2B
W75-04672	2B
W75-04673	2B
W75-04674	2B
W75-04675	2B
W75-04676	2B
W75-04677	2B
W75-04678	2B
W75-04679	2B
W75-04680	2B
W75-04681	7A
W75-04682	7A
W75-04683	2B
W75-04684	2C
W75-04685	2B
W75-04686	2B
W75-04687	7C
W75-04688	7C
W75-04689	2B
W75-04690	2B
W75-04691	7B
W75-04692	2B
W75-04693	7C
W75-04694	4A
W75-04695	2G
W75-04696	8D
W75-04697	7B
W75-04698	2D
W75-04699	5B
W75-04700	2G
W75-04701	2G
W75-04702	2J
W75-04703	2B
W75-04704	2B
W75-04705	2H
W75-04706	2E
W75-04707	2J
W75-04708	5D
W75-04709	5A
W75-04710	2F
W75-04711	2B
W75-04712	2E
W75-04713	2B
W75-04714	5B
W75-04715	8B
W75-04716	2L
W75-04717	2B
W75-04718	5A
W75-04719	5D
W75-04720	5G
W75-04721	3B
W75-04722	5A
W75-04723	5A
W75-04724	2B
W75-04725	2D
W75-04726	7C
W75-04727	4B
W75-04728	1A
W75-04729	2B
W75-04730	7C
W75-04731	7C
W75-04732	7C
W75-04733	7C
W75-04734	7A
W75-04735	7B
W75-04736	7C
W75-04737	7C
W75-04738	2L
W75-04739	2L
W75-04740	2B
W75-04741	2B
W75-04742	4A
W75-04743	4A
W75-04744	4A
W75-04745	4A
W75-04746	4A
W75-04747	4A
W75-04748	4A
W75-04749	4A
W75-04750	4A
W75-04751	4A
W75-04752	4A
W75-04753	4A
W75-04754	4A
W75-04755	6G
W75-04756	6B
W75-04757	5G
W75-04758	5C
W75-04759	5D
W75-04760	3D
W75-04761	5D
W75-04762	3D
W75-04763	6B
W75-04764	3E
W75-04765	5D
W75-04766	6E
W75-04767	6E
W75-04768	6E
W75-04769	6E
W75-04770	6E
W75-04771	6E
W75-04772	6E
W75-04773	6E
W75-04774	6E
W75-04775	6E
W75-04776	6E
W75-04777	5G
W75-04778	6E
W75-04779	5G
W75-04780	6E
W75-04781	6E
W75-04782	6E
W75-04783	6E
W75-04784	6E
W75-04785	6E
W75-04786	6E
W75-04787	6E
W75-04788	6E
W75-04789	6E
W75-04790	6E
W75-04791	2B
W75-04792	2B
W75-04793	8B
W75-04794	2C
W75-04795	7B
W75-04796	7B
W75-04797	8B
W75-04798	5B
W75-04799	5B
W75-04800	5B
W75-04801	5D
W75-04802	8B
W75-04803	5A
W75-04804	5D
W75-04805	5B
W75-04806	5B
W75-04807	5D
W75-04808	8C
W75-04809	8A
W75-04810	5D
W75-04811	5D
W75-04812	5D
W75-04813	5D
W75-04814	5A
W75-04815	5A
W75-04816	5C
W75-04817	5A
W75-04818	5A
W75-04819	5A
W75-04820	5F
W75-04821	5F
W75-04822	5D
W75-04823	5D
W75-04824	5D
W75-04825	5D
W75-04826	5D
W75-04827	5D
W75-04828	5D
W75-04829	5D
W75-04830	5G
W75-04831	5D
W75-04832	5D
W75-04833	5D
W75-04834	5D
W75-04835	5D
W75-04836	5D
W75-04837	2I
W75-04838	5G
W75-04839	5G
W75-04840	5G
W75-04841	5D
W75-04842	5A
W75-04843	5B
W75-04844	6E
W75-04845	6G
W75-04846	5G
W75-04847	2E
W75-04848	5C
W75-04849	5B
W75-04850	3A

ABSTRACT SOURCES

SOURCE	ACCESSION NUMBER	TOTAL
A. CENTERS OF COMPETENCE		
AEC Oak Ridge National Laboratory, Nuclear Radiation and Safety	W75-04393--04398 04400--04421	28
Cornell University, Policy Models for Water Resources Systems	W75-04518--04523 04525--04541 04614	24
East Central State College, Agricultural Livestock Wastes	W75-04542--04548 04550 04552--04556 04615--04622 04626--04627 04629--04646 04653 04832--04836 04838--04843	53
Franklin Institute (FIRL), Municipal Wastewater Treatment Technology	W75-04422--04423 04426--04434 04436--04437 04469--04470 04472--04474 04808 04810--04815 04817--04831 04846 04848--04849	43
Illinois State Water Survey, Hydrology	W75-04654--04741 04791--04807	105
Institute of Paper Chemistry, Water Pollution from Pulp and Paper Industry	W75-04476	1

SOURCE	ACCESSION NUMBER	TOTAL
A. CENTERS OF COMPETENCE (Continued)		
University of Arizona, Arid Land Water Resources	W75-04351, 04363 04365--04370 04372--04381 04383 04385--04392 04508--04517 04602--04610 04612--04613 04647	49
University of Florida, Eastern U. S. Water Law	W75-04580--04601 04648--04652 04766--04790 04844--04845	54
University of North Carolina, Metropolitan Water Resources Planning and Management	W75-04359--04362 04742--04765	28
B. STATE WATER RESOURCES RESEARCH INSTITUTES		
Georgia Environmental Resources Center	W75-04356--04358	3
Hawaii Water Resources Research Center	W75-04441--04442	2
Kansas Water Resources Research Institute	W75-04623--04624	2
Missouri Water Resources Research Center	W75-04443	1
Nevada Center for Water Resources Research	W75-04444	1
New York Water Resources and Marine Sciences Center	W75-04445	1
Pennsylvania Institute for Research on Land and Water Resources	W75-04355	1

SOURCE	ACCESSION NUMBER	TOTAL
B. STATE WATER RESOURCES RESEARCH INSTITUTES (Continued)		
Rhode Island Water Resources Center	W75-04446	1
South Carolina Water Resources Research Institute	W75-04447--04448	2
Texas Water Resources Institute	W75-04449	1
Wyoming Water Resources Research Institute	W75-04450	1
C. OTHER		
BioSciences Information Service	W75-04364, 04371 04382, 04384 04399 04424--04425 04435, 04438 04471, 04475 04477--04507 04524, 04549 04551, 04557 04574 04578--04579 04611, 04628 04809, 04816 04837, 04847	55
Environmental Protection Agency	W75-04560--04573 04575--04577	17
Ocean Engineering Information Service (Patents)	W75-04451--04467	17
Office of Water Research and Technology	W75-04352--04354 04439--04440 04558--04559 04625, 04850	9

☆ U. S. GOVERNMENT PRINTING OFFICE : 1975 582-943/22

CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Illinois State Water Survey and the Water Resources Division of the U.S. Geological Survey, U.S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

Supported by the Environmental Protection Agency in cooperation with WRSIC

- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

Subject Fields

1 NATURE OF WATER

2 WATER CYCLE

3 WATER SUPPLY AUGMENTATION AND CONSERVATION

4 WATER QUANTITY MANAGEMENT AND CONTROL

5 WATER QUALITY MANAGEMENT AND PROTECTION

6 WATER RESOURCES PLANNING

7 RESOURCES DATA

8 ENGINEERING WORKS

9 MANPOWER, GRANTS, AND FACILITIES

0 SCIENTIFIC AND TECHNICAL INFORMATION

INDEXES

SUBJECT INDEX

AUTHOR INDEX

ORGANIZATIONAL INDEX

ACCESSION NUMBER INDEX

ABSTRACT SOURCES

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

OFFICIAL BUSINESS

PRINTED MATTER

AN EQUAL OPPORTUNITY EMPLOYER

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE
COM 211

SWRA
XEROX UNIVERSITY MICROFILMS X750630
SERIALS DEPARTMENT
300 NORTH ZEEB ROAD
ANN ARBOR MI 48106 001